

# *Existing Mill Yard Equipment 100% Design Analysis Report Volume 2 – Specifications*

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## *Operable Unit 4 at Roebling Steel Superfund Site*

Florence Township, New Jersey  
Prepared for  
**US Environmental Protection Agency  
Region 2**



and

**US Army Corps of Engineers  
Kansas City District**  
Contract W912DQ-D-15-3011  
Delivery Order 0002



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# *Existing Mill Yard Equipment 100% Design Analysis Report Volume 2 – Specifications*

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*Operable Unit 4 at Roebling Steel Superfund Site*

*Florence Township, New Jersey*

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## SECTION 01 11 00

## SUMMARY OF WORK

08/15

## PART 1 GENERAL

## 1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Contractor Health and Safety Plan; G  
Community Air Monitoring Plan; G  
Schedule of prices or Earned Value Report; G  
Certificates of Insurance; G  
List of proposed subcontractors; G  
List of proposed products; G  
Paint Scheme, Stencils, Sacrificial Wood Plans; G  
Backup for Materials Used; G  
Backup for subcontractors including lifts and cranes; G  
Timesheets for labor; G

## SD-01 Preconstruction Submittals

Contractor Regulations; G  
List of Contact Personnel; G  
Personnel List; G  
View Location Map; G  
Progress and Completion Pictures; G  
Initial Project Schedule; G  
Periodic Schedule Update; G  
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Accident Prevention Plan (APP; G  
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Exposure Monitoring/Air Sampling Program; G  
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- SSHO's Daily Inspection Logs; G
- Vacuum Filters; G
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- Work Plan; G
- Materials; G
- Qualifications; G
- Certification; G
- Coating; G
- Manufacturer's Technical Data Sheets; G
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SD-04 Samples

- Color; G

SD-05 Design Data

- Discipline-Specific Checklists
- Design Quality Control
- Containment System

SD-06 Test Reports

- Monthly Exposure Reports
- Notifications and Reports
- Accident Reports
- LHE Inspection Reports
- Sampling Results
- Occupational and Environmental Assessment Data Report

SD-07 Certificates

- Crane Operators/Riggers; G
- Standard Lift Plan; G
- Activity Hazard Analysis (AHA); G
- Certificate of Compliance; G
- License Certificates; G
- Certificate Of Worker/Visitor Acknowledgement; G
- Employee Training Records; G
- Certificate of Competency; G
- Qualifications of CP; G
- Testing Laboratory; G
- Occupant Notification; G
- Training Certification; G
- Notification of the Commencement of [LBP] Hazard Abatement; G
- Third Party Consultant Qualifications; G
- lead-based paint/paint with lead removal/control plan; G
- Rental equipment notification; G
- Respiratory Protection Program; G
- Hazard Communication Program; G
- EPA approved hazardous waste treatment, storage, or disposal facility; G
- Lead Waste Management Plan; G
- Vacuum filters; G
- Clearance Certification; G
- Work Plan; G
- Applicator's qualifications; G
- Qualification Testing; G
- Contract Errors, Omissions, and Other Discrepancies; G

- Corrective Action Procedures; G
- Coating Work Plan; G
- Qualifications of Certified Industrial Hygienist (CIH); G
- Qualifications Of Individuals Performing Abrasive Blasting; G
- Qualifications of Coating Contractors; G
- Joint Sealant Materials; G
- Coating Materials; G
- Coating System Component Compatibility; G
- Non-metallic Abrasive; G

SD-08 Manufacturer's Instructions

- Instructions; G
- Application instructions; G
- Mixing; G
- Manufacturer's Safety Data Sheets; G
- Joint Sealant Instructions; G
- Coating System Instructions; G
- Vertical Overhead Repair Mortar Instructions; G
- Concrete Toppings; G
- Concrete Resurfacing Instructions; G
- Concrete Rehabilitation; G
- Epoxy Instructions; G

SD-10 Operation and Maintenance Data

- Coatings; G

SD-11 Closeout Submittals

- Safety And Health Phase-Out Report; G
- Waste Determination Documentation; G
- Disposal Documentation for Hazardous and Regulated Waste; G
- Assembled Employee Training Records; G
- Hazardous Waste/Debris Management; G
- Regulatory Notifications; G
- Sales Documentation; G
- Contractor Certification; G
- As-Built Record of Equipment and Materials; G
- Final Approved Shop Drawings; G
- Hazardous Waste Manifest; G
- Medical Examinations; G
- Training Certification; G
- Disposal of Used Abrasive; G
- Inspection Logbook; G

1.2 WORK COVERED BY CONTRACT DOCUMENTS

1.2.1 Project Description

The work includes preservation of the Existing Mill Yard Equipment presented on the on the Roebling Steel Superfund Site Project/Contract Description 2 Existing Mill Yard Equipment Drawings dated December 2017 and incidental related work.

1.2.2 Location

The work is located at the **Roebling Museum**, approximately as indicated. The exact location will be shown by the Contracting Officer.

1.3 OCCUPANCY OF PREMISES

Before work is started, arrange with the Contracting Officer a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches.

[1.4 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements":

- a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.
- b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work must be in a condition equal to or better than that which existed before new work started.

]1.5 LOCATION OF UNDERGROUND UTILITIES

**Not applicable. No ground intrusive work is included in the scope for artifact preservation.**

1.5.1 Notification Prior to **Initiating Preservation Activities**

Notify the Contracting Officer at least **1 week** prior to starting **preservation** work.

[1.6 GOVERNMENT-FURNISHED MATERIAL AND EQUIPMENT

**Not applicable.**

1.6.1 Delivery Schedule

**Not applicable.**

]1.6.2 Delivery Location

**Not applicable.**

][1.7 GOVERNMENT-INSTALLED WORK

**Not Applicable.**

]1.8 SALVAGE MATERIAL AND EQUIPMENT

**Not applicable.**

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

## SECTION 01 14 00

## WORK RESTRICTIONS

11/11

## PART 1 GENERAL

## [1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES SD-:

## SD-01 Preconstruction Submittals

Contractor Regulations; G[, [\_\_\_\_]]

List of Contact Personnel; G[, [\_\_\_\_]]

Personnel List; G[, [\_\_\_\_]]

See Section 01 11 00 for the list of submittals.

## ][1.2 SPECIAL SCHEDULING REQUIREMENTS

The Contractor will schedule work to minimize disturbance to museum activities to the extent practicable. The Contractor will not perform any work during special events at the museum.

## ]1.3 CONTRACTOR ACCESS AND USE OF PREMISES

## 1.3.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. Mark Contractor equipment for identification.

Liners will be used to collect any medium that becomes airborne during the restoration process (e.g., air abrasion media, rust, acids and paint) for removal from the site.

## 1.3.1.1 Subcontractors and Personnel Contacts

Provide a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

## 1.3.1.2 No Smoking Policy

Smoking is prohibited within and outside of all buildings on installation, except in designated smoking areas. This applies to existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

## 1.3.2 Working Hours

Regular working hours must consist of an 8 1/2 hour period established by the Contracting Officer, between [7 a.m. and 5:30 p.m.,] Monday through Friday, excluding Government holidays.

## 1.3.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work must be lighted in a manner approved by the Contracting Officer.

## [1.3.4 Exclusionary Period

Not applicable.

## ][1.3.5 Occupied Building[s]

The Contractor shall be working [around existing buildings]outside of the Roebling Museum which is occupied. Do not enter the buildings without prior approval of the Contracting Officer.

The museum fencing must be kept secure at all times except during the hours the museum is open to the public.

## ]]1.3.6 Utility Cutovers and Interruptions

Not applicable.

## ][1.3.7 Shipyard Area Work Clearance Request

## [1.3.7.1 Shipyard Hazardous Areas

Not applicable.

## ]][1.4 SECURITY REQUIREMENTS

[ Contract Clause "FAR 52.204-2, Security Requirements and Alternate II," "FAC 5252.236-9301, Special Working Conditions and Entry to Work Area," and the following apply:

Not applicable.

## ]]PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

Not Used

-- End of Section --

## SECTION 01 22 00.00 10

## PRICE AND PAYMENT PROCEDURES

08/15

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Backup for Materials Used  
Backup for subcontractors including lifts and cranes  
Timesheets for labor

## 1.3 SINGLE JOB PAYMENT ITEMS

Payment items for the work of this contract for which contract job payments will be made are listed in the SCHEDULE provided separately. All costs for items of work, which are not specifically mentioned to be included in a particular job or unit price payment item, are included in the listed job item most closely associated with the work involved. The job price and payment made for each item listed constitutes full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.3.1 [Enter Appropriate Subpart Title Here]1.3.1.1 [Enter Appropriate Subpart Title Here]

1.3.1.2 [Enter Appropriate Subpart Title Here]

## 1.4 UNIT PRICE PAYMENT ITEMS

Payment items for the work of this contract on which the contract unit price payments will be made are listed in the SCHEDULE and provided separately. The unit price and payment made for each item listed constitutes full compensation for furnishing all labor, materials, and

equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items.

1.4.1 [Enter Appropriate Subpart Title Here]1.4.1.1 [Enter Appropriate Subpart Title Here]

1.4.2 1.4.2.1 [Enter Appropriate Subpart Title Here]

1.4.2.2 [Enter Appropriate Subpart Title Here]

1.4.3 [Enter Appropriate Subpart Title Here]1.4.3.1 [Enter Appropriate Subpart Title Here]

1.4.3.2 [Enter Appropriate Subpart Title Here]

[1.5 [Enter Appropriate Subpart Title Here]

]PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

[ Not Used][3.1 CONTRACT COST BREAKDOWN

The Contractor must furnish within 30 days after the date of Notice to Proceed, and prior to the submission of its first partial payment estimate, a breakdown of its single job pay item or items which will be reviewed by the Contracting Officer as to propriety of distribution of the total cost to the various accounts. Any unbalanced items as between early and late payment items or other discrepancies will be revised by the Contracting Officer to agree with a reasonable cost of the work included in the various items. This contract cost breakdown will then be utilized as the basis for progress payments to the Contractor.

] -- End of Section --

## SECTION 01 30 00

## ADMINISTRATIVE REQUIREMENTS

08/15

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1

(2014) Safety and Health Requirements Manual

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

View Location Map; G[, [\_\_\_\_\_]]

Progress and Completion Pictures; G[, [\_\_\_\_\_]]

## 1.3 VIEW LOCATION MAP

Submit, prior to or with the first digital photograph submittals, a sketch or drawing indicating the required photographic locations. Update as required if the locations are moved.

## 1.4 PROGRESS AND COMPLETION PICTURES

Photographically document site conditions prior to start of on-site preservation operations. Take a minimum of 20 digital photographs each week throughout the entire project from a minimum of ten views from points located by the Contracting Officer. Submit with the monthly invoice two sets of digital photographs, each set on a separate compact disc (CD) or data versatile disc (DVD), cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Provide photographs for each month in a separate monthly directory and name each file to indicate its location on the view location sketch. Also provide the view location sketch on the CD or DVD as a digital file. Include a date designator in file names. Cross reference submittals in the appropriate daily report. Photographs provided are for unrestricted use by the Government.

### 1.5 MINIMUM INSURANCE REQUIREMENTS

Provide the minimum insurance coverage required by FAR 28.307-2 LIABILITY, during the entire period of performance under this contract. Provide other insurance coverage as required by [State ]law.

### 1.6 FIRST TIER CONTRACTOR REQUIREMENTS FOR ASBESTOS CONTAINING MATERIALS

Not Applicable.

### 1.7 SUPERVISION

#### 1.7.1 Minimum Communication Requirements

Have at least one qualified superintendent, or competent alternate, capable of reading, writing, and conversing fluently in the English language, on the job-site at all times during the performance of contract work. In addition, if a Quality Control (QC) representative is required on the contract, then that individual must also have fluent English communication skills.

#### 1.7.2 Superintendent Qualifications

The project superintendent must have a minimum of 10 years experience in artifact preservation with at least 5 of those years as a superintendent on projects similar in size and complexity. The individual must be familiar with the requirements of EM 385-1-1 and have experience in the areas of hazard identification and safety compliance. The individual must be capable of interpreting a critical path schedule. The qualification requirements for the alternate superintendent are the same as for the project superintendent. The Contracting Officer may request proof of the superintendent's qualifications at any point in the project if the performance of the superintendent is in question.

[ For routine projects where the superintendent is permitted to also serve as the Quality Control (QC) Manager as established in Section [ 01 45 00.00 10][01 45 00.00 40] QUALITY CONTROL, the superintendent must have qualifications in accordance with that section.

##### ]1.7.2.1 Duties

The project superintendent is primarily responsible for managing and coordinating day-to-day production and schedule adherence on the project. The superintendent is required to attend partnering meetings, and quality control meetings. The superintendent or qualified alternative must be on-site at all times during the performance of this contract until the work is completed and accepted.

#### 1.7.3 Non-Compliance Actions

The Project Superintendent is subject to removal by the Contracting Officer for non-compliance with requirements specified in the contract and for failure to manage the project to insure timely completion. Furthermore, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders is acceptable as the subject of claim for extension of time for excess costs or damages by the Contractor.

## 1.8 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the value engineering and safety program, preparation of the schedule of prices or earned value report, shop drawings, and other submittals, scheduling programming, prosecution of the work, and clear expectations of the "Interim DD Form 1354" Submittal. Major subcontractors who will engage in the work must also attend.

## 1.9 PARTNERING

To most effectively accomplish this contract, the Government requires the formation of a cohesive partnership within the Project Team whose members are from the Government, the Contractor and their Subcontractors. Key personnel from the Supported Command, the End User (who will occupy the facility), the Government Design and Construction team and Subject Matter Experts, the Installation, the Contractor and Subcontractors, and the Designer of Record will be invited to participate in the Partnering process. The Partnership will draw on the strength of each organization in an effort to achieve a project that is without any safety mishaps, conforms to the Contract, and stays within budget and on schedule.

The Contracting Officer will provide Information on the Partnering Process and a list of key and optional personnel who should attend the Partnering meeting.

### [1.9.1 Informal Partnering

The Contracting Officer will organize the Partnering Sessions with key personnel of the project team, including Contractor personnel and Government personnel.

The Initial Partnering session should be a part of the Pre-Construction Meeting. Partnering sessions will be held at a location agreed to by the Contracting Officer and the Contractor (typically a conference room provided by the Resident Engineer office or the Contractor). The Initial Informal Partnering Session will be conducted and facilitated using electronic media (a video and accompanying forms) provided by the Contracting Officer. The Partners will determine the frequency of the follow-on sessions, at no more than 3 to six month intervals.

### ]1.10 ELECTRONIC MAIL (E-MAIL) ADDRESS

Establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments as text files, pdf files, and other similar formats. Within 10 days after contract award, provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use email to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes or terrorist threats. Multiple email addresses are not allowed.

It is the Contractor's responsibility to make timely distribution of all Contracting Officer initiated e-mail with its own organization including field office(s). Promptly notify the Contracting Officer, in writing, of

any changes to this email address.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

## SECTION 01 32 01.00 10

PROJECT SCHEDULE  
02/15

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AACE INTERNATIONAL (AACE)

AACE 29R-03 (2011) Forensic Schedule Analysis

AACE 52R-06 (2006) Time Impact Analysis - As Applied in Construction

## U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11 (1995) Administration -- Progress, Schedules, and Network Analysis Systems

## 1.2 SUBMITTALS

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## SD-01 Preconstruction Submittals

Initial Project Schedule; G[, [\_\_\_\_]]

Periodic Schedule Update; G[, [\_\_\_\_]]

## 1.3 PROJECT SCHEDULER QUALIFICATIONS

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating and production of reports. The authorized representative must have a minimum of 2-years experience scheduling construction projects similar in size and nature to this project with scheduling software that meets the requirements of this specification. Representative must have a comprehensive knowledge of CPM scheduling principles and application.

## PART 2 PRODUCTS

### 2.1 SOFTWARE

The scheduling software utilized to produce and update the schedules required herein must be capable of meeting all requirements of this specification.

#### 2.1.1 Government Default Software

The Government intends to use Primavera P6.

#### 2.1.2 Contractor Software

Scheduling software used by the contractor must be commercially available from the software vendor for purchase with vendor software support agreements available. The software routine used to create the required sdef file must be created and supported by the software manufacturer.

##### 2.1.2.1 Primavera

If Primavera P6 is selected for use, provide the "xer" export file in a version of P6 importable by the Government system.

##### 2.1.2.2 Other Than Primavera

If the contractor chooses software other than Primavera P6, that is compliant with this specification, provide for the Government's use two licenses, two computers, and training for two Government employees in the use of the software. These computers will be stand-alone and not connected to Government network. Computers and licenses will be returned at project completion.

## PART 3 EXECUTION

### 3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to FAR Clause 52.236-15, SCHEDULE FOR CONSTRUCTION CONTRACTS. Show in the schedule the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities. The scheduling of the entire project is required. The scheduling of construction is the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool. Use the Critical Path Method (CPM) of network calculation to generate all Project Schedules. Prepare each Project Schedule using the Precedence Diagram Method (PDM).

### 3.2 BASIS FOR PAYMENT AND COST LOADING

The schedule is the basis for determining contract earnings during each update period and therefore the amount of each progress payment. The aggregate value of all activities coded to a contract CLIN must equal the value of the CLIN.

### 3.2.1 Activity Cost Loading

Activity cost loading must be reasonable and without front-end loading. Provide additional documentation to demonstrate reasonableness if requested by the Contracting Officer.

### 3.2.2 Withholdings / Payment Rejection

Failure to meet the requirements of this specification may result in the disapproval of the preliminary, initial or periodic schedule updates and subsequent rejection of payment requests until compliance is met.

In the event that the Contracting Officer directs schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the Contracting Officer may withhold 10 percent of pay request amount from each payment period until such revisions to the project schedule have been made.

## 3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

### 3.3.1 Level of Detail Required

Develop the Project Schedule to the appropriate level of detail to address major milestones and to allow for satisfactory project planning and execution. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

### 3.3.2 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities may have Original Durations (OD) greater than 20 work days or 30 calendar days.

### 3.3.3 Procurement Activities

Include activities associated with the critical submittals and their approvals, procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

### 3.3.4 Mandatory Tasks

Not applicable.

### 3.3.5 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: **submittal review and approval**, inspections, and Notice to Proceed (NTP).

### 3.3.6 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in **ER 1-1-11**. This exact structure is mandatory. Develop and assign all Activity Codes to activities as detailed herein. A template SDEF compatible schedule backup file is available on the QCS web

site: <http://rms.usace.army.mil>.

The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per day
2	RESP	4	Responsible party
3	AREA	4	Area of work
4	MODF	6	Modification Number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of work
7	CATW	1	Category of work
8	FOW	20	Feature of work*
*Some systems require that FEATURE OF WORK values be placed in several activity code fields. The notation shown is for Primavera P6. Refer to the specific software guidelines with respect to the FEATURE OF WORK field requirements.			

#### 3.3.6.1 Workers Per Day (WRKP)

Assign Workers per Day for all field construction or direct work activities, if directed by the Contracting Officer. Workers per day is based on the average number of workers expected each day to perform a task for the duration of that activity.

#### 3.3.6.2 Responsible Party Coding (RESP)

Assign responsibility code for all activities to the Prime Contractor, Subcontractor(s) or Government agency(ies) responsible for performing the activity.

- a. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Property/Equipment (GFP) and Notice to Proceed (NTP) for phasing requirements.
- b. Activities cannot have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE).

#### 3.3.6.3 Area of Work Coding (AREA)

Assign Work Area code to activities based upon the work area in which the

activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities cannot have more than one Work Area Code.

Not all activities are required to be Work Area coded. A lack of Work Area coding indicates the activity is not resource or space constrained.

#### 3.3.6.4 Modification Number (MODF)

Assign a Modification Number Code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer. Key all Code values to the Government's modification numbering system. An activity can have only one Modification Number Code.

#### 3.3.6.5 Bid Item Coding (BIDI)

Assign a Bid Item Code to all activities using the Contract Line Item Schedule (CLIN) to which the activity belongs, even when an activity is not cost loaded. An activity can have only one BIDI Code.

#### 3.3.6.6 Phase of Work Coding (PHAS)

#### 3.3.6.7 Category of Work Coding (CATW)

Assign a Category of Work Code to all activities. Category of Work Codes include, but are not limited to construction submittal, procurement, fabrication, weather sensitive installation, non-weather sensitive installation, start-up, and testing activities. Each activity can have no more than one Category of Work Code.

#### 3.3.6.8 Feature of Work Coding (FOW)

Assign a Feature of Work Code to appropriate activities based on the Definable Feature of Work to which the activity belongs based on the approved QC plan.

Definable Feature of Work is defined in Section 01 45 00.00 10 QUALITY CONTROL. An activity can have only one Feature of Work Code.

#### 3.3.7 Contract Milestones and Constraints

Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.

Mandatory constraints that ignore or effect network logic are prohibited. No constrained dates are allowed in the schedule other than those specified herein. Submit additional constraints to the Contracting Officer for approval on a case by case basis.

##### 3.3.7.1 Project Start Date Milestone and Constraint

The first activity in the project schedule must be a start milestone

titled "NTP Acknowledged," which must have a "Start On" constraint date equal to the date that the NTP is acknowledged.

#### 3.3.7.2 End Project Finish Milestone and Constraint

The last activity in the schedule must be a finish milestone titled "End Project."

Constrain the project schedule to the Contract Completion Date in such a way that if the schedule calculates an early finish, then the float calculation for "End Project" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "End Project" milestone float calculation reflects negative float on the longest path. The Government is under no obligation to accelerate Government activities to support a Contractor's early completion.

#### 3.3.7.3 Interim Completion Dates and Constraints

Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.

##### 3.3.7.3.1 Start Phase

Use a start milestone as the first activity for a project phase. Call the start milestone "Start Phase X" where "X" refers to the phase of work.

##### 3.3.7.3.2 End Phase

Use a finish milestone as the last activity for a project phase. Call the finish milestone "End Phase X" where "X" refers to the phase of work.

#### 3.3.8 Calendars

Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a 7-day calendar for Government Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop sSeasonal Calendar(s) and assign to seasonally affected activities as applicable.

If an activity is weather sensitive it should be assigned to a calendar showing non-work days on a monthly basis, with the non-work days selected at random across the weeks of the calendar, using the anticipated days provided in the contract clause TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER. Assign non-work days over a seven-day week as weather records are compiled on seven-day weeks, which may cause some of the weather related non-work days to fall on weekends.

#### 3.3.9 Open Ended Logic

Only two open ended activities are allowed: the first activity "NTP Acknowledged" may have no predecessor logic, and the last activity -"End Project" may have no successor logic.

Predecessor open ended logic may be allowed in a time impact analyses upon the Contracting Officer's approval.

### 3.3.10 Default Progress Data Disallowed

Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. Disable program features that calculate one of these parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Contractor Quality Control Reports. Failure to document the AS and AF dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.

### 3.3.11 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative Report and in the periodic schedule update meetings.

### 3.3.12 Added and Deleted Activities

Do not delete activities from the project schedule or add new activities to the schedule without approval from the Contracting Officer. Activity ID and description changes are considered new activities and cannot be changed without Contracting Officer approval.

### 3.3.13 Original Durations

Activity Original Durations (OD) must be reasonable to perform the work item. OD changes are prohibited unless justification is provided and approved by the Contracting Officer.

### 3.3.14 Leads, Lags, and Start to Finish Relationships

Lags must be reasonable as determined by the Government and not used in place of realistic original durations, must not be in place to artificially absorb float, or to replace proper schedule logic.

- a. Leads (negative lags) are prohibited.
- b. Start to Finish (SF) relationships are prohibited.

### 3.3.15 Retained Logic

Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not be allowed.

### 3.3.16 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but

for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

### 3.3.17 Remaining Duration

Update the remaining duration for each activity based on the number of estimated work days it will take to complete the activity. Remaining duration may not mathematically correlate with percentage found under paragraph entitled Percent Complete.

### 3.3.18 Cost Loading of Closeout Activities

Cost load the "Correction of punch list from Government pre-final inspection" activity(ies) not less than 1 percent of the present contract value. Activity(ies) may be declared 100 percent complete upon the Government's verification of completion and correction of all punch list work identified during Government pre-final inspection(s).

#### 3.3.18.1 As-Built Drawings

Not applicable.

#### 3.3.18.2 O & M Manuals

Not applicable.

### 3.3.19 Anticipated Adverse Weather

Paragraph applicable to contracts with clause entitled TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER. Reflect the number of anticipated adverse weather delays allocated to a weather sensitive activity in the activity's calendar.

### 3.3.20 Early Completion Schedule and the Right to Finish Early

An Early Completion Schedule is an Initial Project Schedule (IPS) that indicates all scope of the required contract work will be completed before the contractually required completion date.

- a. No IPS indicating an Early Completion will be accepted without being fully resource-loaded (including crew sizes and manhours) and the Government agreeing that the schedule is reasonable and achievable.
- b. The Government is under no obligation to accelerate work items it is responsible for to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the contractor's accelerated work.

## 3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD/DVD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, then the Contractor will be deemed not to have provided an estimate upon which a progress payment can be made.

Review comments made by the Government on the schedule(s) do not relieve

the Contractor from compliance with requirements of the Contract Documents.

#### 3.4.1 Preliminary Project Schedule Submission

Within 15 calendar days after the NTP is acknowledged submit the [Preliminary Project Schedule](#) defining the planned operations detailed for the first 90 calendar days for approval. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, planned submissions of all early design packages, permitting activities, design review conference activities, and other non-construction activities intended to occur within the first 90 calendar days. Government acceptance of the associated design package(s) and all other specified Program and Plan approvals must occur prior to any planned construction activities. Activity code any activities that are summary in nature after the first 90 calendar days with Bid Item (CLIN) code (BIDI), Responsibility Code (RESP) and Feature of Work code (FOW).

#### 3.4.2 Initial Project Schedule Submission

#### 3.4.3 Periodic Schedule Updates

Update the Project Schedule on a regular basis, monthly at a minimum. Provide a draft Periodic Schedule Update for review at the schedule update meetings as prescribed in the paragraph PERIODIC SCHEDULE UPDATE MEETINGS. These updates will enable the Government to assess Contractor's progress.

- a. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of the Government at the meeting.
- b. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for an activity start or finish.

### 3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

#### 3.5.1 Data CD/DVDs

Provide two sets of data CD/DVDs containing the current project schedule and all previously submitted schedules in the format of the scheduling software (e.g. .xer). Also include on the data CD/DVDs the Narrative Report and all required Schedule Reports. Label each CD/DVD indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file name. Each schedule must have a unique file name and use project specific settings.

### 3.5.2 Narrative Report

Provide a Narrative Report with each schedule submission. The Narrative Report is expected to communicate to the Government the thorough analysis of the schedule output and the plans to compensate for any problems, either current or potential, which are revealed through that analysis. Include the following information as minimum in the Narrative Report:

- a. Identify and discuss the work scheduled to start in the next update period.
- b. A description of activities along the two most critical paths where the total float is less than or equal to 20 work days.
- c. A description of current and anticipated problem areas or delaying factors and their impact and an explanation of corrective actions taken or required to be taken.
- d. Identify and explain why activities based on their calculated late dates should have either started or finished during the update period but did not.
- e. Identify and discuss all schedule changes by activity ID and activity name including what specifically was changed and why the change was needed. Include at a minimum new and deleted activities, logic changes, duration changes, calendar changes, lag changes, resource changes, and actual start and finish date changes.
- f. Identify and discuss out-of-sequence work.

### 3.5.3 Schedule Reports

The format, filtering, organizing and sorting for each schedule report will be as directed by the Contracting Officer. Typically, reports contain Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. Provide the reports electronically in .pdf format. Provide [\_\_\_\_\_] set(s) of hardcopy reports. The following lists typical reports that will be requested:

#### 3.5.3.1 Activity Report

List of all activities sorted according to activity number.

#### 3.5.3.2 Logic Report

List of detailed predecessor and successor activities for every activity in ascending order by activity number.

#### 3.5.3.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

#### 3.5.3.4 Earnings Report by CLIN

A compilation of the Total Earnings on the project from the NTP to the data date, which reflects the earnings of activities based on the agreements made in the schedule update meeting defined herein. Provided a complete schedule update has been furnished, this report serves as the basis of determining progress payments. Group activities by CLIN number and sort by activity number. Provide a total CLIN percent earned value, CLIN percent complete, and project percent complete. The printed report must contain the following for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Earnings to Date, Earnings this period, Total Quantity, Quantity to Date, and Percent Complete (based on cost).

#### 3.5.3.5 Schedule Log

Provide a Scheduling/Leveling Report generated from the current project schedule being submitted.

#### 3.5.4 Network Diagram

The Network Diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

##### 3.5.4.1 Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

##### 3.5.4.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

##### 3.5.4.3 Critical Path

Show all activities on the critical path. The critical path is defined as the longest path.

##### 3.5.4.4 Banding

Organize activities using the WBS or as otherwise directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by major elements of work, category of work, work area and/or responsibility.

##### 3.5.4.5 Cash Flow / Schedule Variance Control (SVC) Diagram

With each schedule submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates, and 2) Earned Value to-date.

### 3.6 PERIODIC SCHEDULE UPDATE

#### 3.6.1 Periodic Schedule Update Meetings

Conduct periodic schedule update meetings for the purpose of reviewing the proposed Periodic Schedule Update, Narrative Report, Schedule Reports, and progress payment. Conduct meetings at least monthly within five days of the proposed schedule data date. Provide a computer with the scheduling software loaded and a projector which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must organize, group, sort, filter, perform schedule revisions as needed and review functions as requested by the Contractor and/or Government. The meeting is a working interactive exchange which allows the Government and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting will last no longer than 8 hours. Provide a draft of the proposed narrative report and schedule data file to the Government a minimum of two workdays in advance of the meeting. The Contractor's Project Manager and scheduler must attend the meeting with the authorized representative of the Contracting Officer. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make corrections to the draft submission. Include only those changes approved by the Government in the submission and invoice for payment.

#### 3.6.2 Update Submission Following Progress Meeting

Submit the complete [Periodic Schedule Update](#) of the Project Schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 work days after the periodic schedule update meeting.

### 3.7 WEEKLY PROGRESS MEETINGS

Conduct a weekly meeting with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph entitled PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. Use the current approved schedule update for the purposes of this meeting and for the production and review of reports. At the weekly progress meeting, address the status of RFIs, RFPs and Submittals.

### 3.8 REQUESTS FOR TIME EXTENSIONS

Provide a justification of delay to the Contracting Officer in accordance with the contract provisions and clauses for approval within 10 days of a delay occurring. Also prepare a time impact analysis for each Government request for proposal (RFP) to justify time extensions.

#### 3.8.1 Justification of Delay

Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Government. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple

impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Contracting Officer.

### 3.8.2 Time Impact Analysis (Prospective Analysis)

Prepare a time impact analysis for approval by the Contracting Officer based on industry standard [AACE 52R-06](#). Utilize a copy of the last approved schedule prior to the first day of the impact or delay for the time impact analysis. If Contracting Officer determines the time frame between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Contracting Officer, no other changes may be incorporated into the schedule being used to justify the time impact.

### 3.8.3 Forensic Schedule Analysis (Retrospective Analysis)

Prepare an analysis for approval by the Contracting Officer based on industry standard [AACE 29R-03](#).

### 3.8.4 Fragmentary Network (Fragnet)

Prepare a proposed fragnet for time impact analysis consisting of a sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Contracting Officer prior to incorporation into the project schedule.

### 3.8.5 Time Extension

The Contracting Officer must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

### 3.8.6 Impact to Early Completion Schedule

No extended overhead will be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact.

## 3.9 FAILURE TO ACHIEVE PROGRESS

Should the progress fall behind the approved project schedule for reasons other than those that are excusable within the terms of the contract, the Contracting Officer may require provision of a written recovery plan for

approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra work days, etc.

#### 3.9.1 Artificially Improving Progress

Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic, constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

#### 3.9.2 Failure to Perform

Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in an interim and final unsatisfactory performance rating and may result in corrective action directed by the Contracting Officer pursuant to FAR 52.236-15 Schedules for Construction Contracts, FAR 52.249-10 Default (Fixed-Price Construction), and other contract provisions.

#### 3.9.3 Recovery Schedule

Should the Contracting Officer find it necessary, submit a recovery schedule pursuant to FAR 52.236-15 Schedules for Construction Contracts.

#### 3.10 OWNERSHIP OF FLOAT

Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, may not be considered for the exclusive use of either the Government or the Contractor including activity and/or project float. Activity float is the number of work days that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of work days between the projected early finish and the contract completion date milestone.

#### 3.11 TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Import the schedule data into the Quality Control System (QCS) and export the QCS data to the Government. This data is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and matching electronic export from QCS of the application for progress payment.

#### 3.12 PRIMAVERA P6 MANDATORY REQUIREMENTS

If Primavera P6 is being used, request a backup file template (.xer) from the Government, if one is available, prior to building the schedule. The following settings are mandatory and required in all schedule submissions to the Government:

- a. Activity Codes must be Project Level, not Global or EPS level.
- b. Calendars must be Project Level, not Global or Resource level.
- c. Activity Duration Types must be set to "Fixed Duration & Units".
- d. Percent Complete Types must be set to "Physical".
- e. Time Period Admin Preferences must remain the default "8.0 hr/day, 40 hr/week, 172 hr/month, 2000 hr/year". Set Calendar Work Hours/Day to 8.0 Hour days.
- f. Set Schedule Option for defining Critical Activities to "Longest Path".
- g. Set Schedule Option for defining progressed activities to "Retained Logic".
- h. Set up cost loading using a single lump sum labor resource. The Price/Unit must be \$1/hr, Default Units/Time must be "8h/d", and settings "Auto Compute Actuals" and "Calculate costs from units" selected.
- i. Activity ID's must not exceed 10 characters.
- j. Activity Names must have the most defining and detailed description within the first 30 characters.

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES

05/11

PART 1 GENERAL

1.1 SUMMARY

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Safety Data Sheets (SDS) and in compliance with existing laws and regulations.

A submittal register showing items of equipment and materials for when submittals are required by the specifications is provided as "Appendix A - Submittal Register".

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows: **List of proposed subcontractors**

**SD-01 Preconstruction Submittals**

Submittals which are required prior to **the start of preservation work.**

Certificates of insurance

List of proposed Subcontractors

List of proposed products

Submittal register

Health and safety plan

Work plan

Quality Control(QC) plan

#### SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

#### SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

#### SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

#### SD-05 Design Data

#### SD-06 Test Reports

Not applicable.

#### SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that the product, system, or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

#### SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (SDS) concerning impedances, hazards and safety precautions.

#### SD-10 Operation and Maintenance Data

Not applicable.

#### SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

#### 1.2.2 Approving Authority

Office or designated person authorized to approve submittal.

#### 1.2.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

#### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor QC approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with this section.

##### SD-01 Preconstruction Submittals

Submittal Register; G

See Section 01 11 00 for the list of submittals.

#### 1.4 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.4.1 Designer of Record Approved (DA)

Not applicable.

1.4.2 Government Approved (G)

Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings."

1.4.3 For Information Only

Not Applicable.

1.4.4 Sustainability Reporting Submittals (S)

Not applicable.

1.5 PREPARATION

1.5.1 Transmittal Form

Not applicable.

1.5.2 Source Drawings for Shop Drawings

The entire set of Source Drawing files (DWG) will not be provided to the Contractor. Only those requested by the Contractor to prepare shop drawings may be provided. Request the specific Drawing Number only for the preparation of Shop Drawings. These drawings may only be provided after award.

1.5.2.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic Source Drawing files are not construction documents. Differences may exist between the Source Drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic Source Drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source Drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic Source Drawing files for use in producing

construction data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

## 1.6 QUANTITY OF SUBMITTALS

### 1.6.1 Number of Samples SD-04 Samples

Not applicable.

## 1.7 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

## 1.8 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. The Government will provide the initial submittal register in electronic format.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

[ Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

]

### 1.8.1 Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

[ Column (a) Activity Number: Activity number from the project schedule.

][ Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

][ Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

][ Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

#### 1.8.2 Contractor Use of Submittal Register

Update the following fields[ in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor] with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

#### 1.8.3 Approving Authority Use of Submittal Register

Update the following fields[ in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor].

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p) List Date related to review actions.

Column (q) List date returned to Contractor.

#### 1.8.4 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

### 1.9 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

#### 1.9.1 Considering Variations

Discussion with Contracting Officer prior to submission, after consulting with the DOR, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in

transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

#### 1.9.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

#### 1.9.3 Warranting that Variations are Compatible

When delivering a variation for approval, Contractor, including its Designer(s) of Record, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

#### 1.9.4 Review Schedule Extension

In addition to normal submittal review period, a period of [10] [\_\_\_\_\_] working days will be allowed for consideration by the Government of submittals with variations.

### 1.10 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. An additional [\_\_\_\_\_] calendar days will be allowed and shown on the register for review and approval of submittals for [food service equipment] [and] [refrigeration and HVAC control systems].

- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.
- b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."
- c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.
- d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

## 1.11 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

- a. Note date on which submittal was received.
- b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.
- c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. [\_\_\_\_\_] copies of the submittal will be retained by the Contracting Officer and [\_\_\_\_\_] copies of the submittal will be returned to the Contractor.

## 1.11.1 Review Notations

Submittals will be returned to the Contractor with the following notations:

- a. Submittals marked "approved" or "accepted" authorize the Contractor to proceed with the work covered.
- b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.
- c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.
- d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

## 1.12 DISAPPROVED[ OR REJECTED] SUBMITTALS

Make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the FAR clause entitled CHANGES, is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.13 APPROVED[/ACCEPTED] SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.14 APPROVED SAMPLES

Not applicable.

1.15 WITHHOLDING OF PAYMENT

1.16 STAMPS

Not Applicable.PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

## SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS  
11/15

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.34	(2001; R 2012) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.0	(2012) Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ASSE/SAFE Z359.1	(2016) The Fall Protection Code
ASSE/SAFE Z359.11	(2014) Safety Requirements for Full Body Harnesses
ASSE/SAFE Z359.12	(2009) Connecting Components for Personal Fall Arrest Systems
ASSE/SAFE Z359.14	(2014) Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
ASSE/SAFE Z359.2	(2007) Minimum Requirements for a Comprehensive Managed Fall Protection Program
ASSE/SAFE Z359.3	(2007) Safety Requirements for Positioning and Travel Restraint Systems
ASSE/SAFE Z359.6	(2009) Specifications and Design Requirements for Active Fall Protection Systems
ASSE/SAFE Z359.7	(2011) Qualification and Verification Testing of Fall Protection Products

## ASME INTERNATIONAL (ASME)

ASME B30.20	(2013; INT Oct 2010 - May 2012) Below-the-Hook Lifting Devices
ASME B30.22	(2016) Articulating Boom Cranes
ASME B30.26	(2015; INT Jun 2010 - Jun 2014) Rigging Hardware
ASME B30.3	(2016) Tower Cranes

ASME B30.5	(2014) Mobile and Locomotive Cranes
ASME B30.8	(2015) Floating Cranes and Floating Derricks
ASME B30.9	(2014; INT Feb 2011 - Nov 2013) Slings

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2013) Standard for Portable Fire Extinguishers
NFPA 241	(2013; Errata 2015) Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 51B	(2014) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2) National Electrical Code
NFPA 70E	(2015; ERTA 1 2015) Standard for Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.1400	Cranes and Derricks in Construction
29 CFR 1926.16	Rules of Construction
29 CFR 1926.500	Fall Protection

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA's Confined Space Standard, 29 CFR 1910.146, and designated in writing

to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

#### 1.2.3 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

#### 1.2.4 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

#### 1.2.5 Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance with ASSE/SAFE Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

#### 1.2.6 Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q, and designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and also has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented and include experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented, minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

#### 1.2.7 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

#### 1.2.8 High Risk Activities

High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

#### 1.2.9 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

#### 1.2.10 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or horizontally move a load).

#### 1.2.11 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

#### 1.2.12 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

#### 1.2.13 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

#### 1.2.14 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the

work, or the project.

#### 1.2.15 Qualified Person, Fall Protection (QP for FP)

A QP for FP is a person meeting the requirements of EM 385-1-1 Appendix Q, and ASSE/SAFE Z359.0, with a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

#### 1.2.16 USACE Property and Equipment

Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

#### 1.2.17 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE accident occurs when any one or more of the eight elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents, even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, or roll over). Document an LHE mishap using the Crane High Hazard working group mishap reporting form.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

#### SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G[, [\_\_\_\_\_]]

LHE Inspection Reports

#### SD-07 Certificates

Crane Operators/Riggers

Standard Lift Plan; G

Activity Hazard Analysis (AHA)

Certificate of Compliance

License Certificates

#### 1.4 MONTHLY EXPOSURE REPORTS

Provide a Monthly Exposure Report and attach to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both Prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the voucher.

#### 1.5 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, comply with the most recent edition of USACE EM 385-1-1, and the following [federal, state, and local ][host nation ]laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

#### 1.6 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

##### 1.6.1 Personnel Qualifications

##### 1.6.1.1 Site Safety and Health Officer (SSHO)

Provide an SSHO that meets the requirements of EM 385-1-1 Section 1. The SSHO must ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one (1) person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Alternate SSHO must be at the work site at all times to implement and administer the Contractor's safety program and government-accepted Accident Prevention Plan. The SSHO and Alternate SSHO must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO. When the SSHO is

temporarily (up to 24 hours) off-site, a Designated Representative (DR), as identified in the AHA may be used in lieu of an Alternate SSHO, and must be on the project site at all times when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full time occupation.

#### 1.6.1.1.1 Additional Site Safety and Health Officer (SSHO) Requirements and Duties

The SSHO [may also] [may not] serve as the Quality Control Manager. The SSHO [may also] [may not] serve as the Superintendent.

#### 1.6.1.2 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. Provide the credentials of the Competent Persons(s) to the the Contracting Officer for information in consultation with the Safety Office.

##### 1.6.1.2.1 Competent Person for Confined Space Entry

Not applicable.

##### 1.6.1.2.2 Competent Person for Scaffolding

Provide a Competent Person for Scaffolding who meets the requirements of EM 385-1-1, Section 22.B.02 and herein.

##### 1.6.1.2.3 Competent Person for Fall Protection

Provide a Competent Person for Fall Protection who meets the requirements of EM 385-1-1, Section 21.C.04 and herein.

#### 1.6.1.3 Qualified Trainer Requirements

Not applicable.

#### 1.6.1.4 Dredging Contract Requirements

##### 1.6.1.4.1 Dredging Safety Personnel Requirements

Not applicable

##### 1.6.1.4.2 SSHO Requirements for Dredging

Not applicable.

##### 1.6.1.4.3 Collateral Duty Safety Officer (CDSO) Requirements for Dredging

Not applicable.

#### 1.6.1.4.4 Safety Personnel Training Requirements for Dredging

Not applicable.

#### 1.6.1.5 Crane Operators/Riggers

Provide Operators, Signal Persons, and Riggers meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators and Signal Persons. Provide proof of current qualification.

#### 1.6.2 Personnel Duties

##### 1.6.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

- a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.
- b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.
- c. Use and maintain OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and subcontractors, and make available to the Contracting Officer upon request. Post and maintain the Form 300A on the site Safety Bulletin Board.
- d. Maintain applicable safety reference material on the job site.
- e. Attend the pre-construction conference, pre-work meetings including preparatory meetings, and periodic in-progress meetings.
- f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them.
- g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.
- h. Ensure subcontractor compliance with safety and health requirements.
- i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).
- j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.
- k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSHO are subject to dismissal if the above duties are not being effectively carried out. If Superintendent, QC Manager, or SSHO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the

above duties are again being effectively carried out.

### 1.6.3 Meetings

#### 1.6.3.1 Preconstruction Conference

- a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction conference. This includes the project superintendent, Site Safety and Occupational Health officer, quality control manager, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).
- b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.
- c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for review prior to the start of construction. Work is not permitted to begin work until an APP is established that is acceptable to the Contracting Officer.
- d. The functions of a Preconstruction conference may take place at the Post-Award Kickoff meeting for Design Build Contracts.

#### 1.6.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors on the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

### 1.7 ACCIDENT PREVENTION PLAN (APP)

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. The Government considers

the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP must be signed by an officer of the firm (Prime Contractor senior person), the individual preparing the APP, the on-site superintendent, the designated SSHO, the Contractor Quality Control Manager, and any designated Certified Safety Professional (CSP) or Certified Health Physicist (CIH). The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34), and the environment.

#### 1.7.1 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

- a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.
- b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment and clothing to include selection, use and maintenance.

#### 1.7.2 Plans

Provide plans in the APP in accordance with the requirements outlined in

Appendix A of EM 385-1-1, including the following:

#### 1.7.2.1 Confined Space Entry Plan

Develop a confined or enclosed space entry plan in accordance with EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive CPL 2.100, and any other federal, state and local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

#### 1.7.2.2 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of 3 months.

#### 1.7.2.3 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. In addition, Critical Lift Plans are required for the following:

- a. Lifts over 50 percent of the capacity of barge mounted mobile crane's hoist.
- b. When working around energized power lines where the work will get closer than the minimum clearance distance in EM 385-1-1 Table 16-1.
- c. For lifts with anticipated binding conditions.
- d. When erecting cranes.

##### 1.7.2.3.1 Critical Lift Plan Planning and Schedule

Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

##### 1.7.2.3.2 Lifts of Personnel

In addition to the requirements of EM 385-1-1, Section 16.H.02, for lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

#### 1.7.2.4 Barge Mounted Mobile Crane Lift Plan

Provide a Naval Architecture Analysis and include an LHE Manufacturer's

#### 1.7.2.5 Multi-Purpose Machines, Material Handling Equipment, and Construction Equipment Lift Plan

Not applicable.

#### 1.7.2.6 Fall Protection and Prevention (FP&P) Plan

The plan must comply with the requirements of EM 385-1-1, Section 21.D and ASSE/SAFE Z359.2, be site specific, and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A competent person or qualified person for fall protection must prepare and sign the plan documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, roles and responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Review and revise, as necessary, the Fall Protection and Prevention Plan documentation as conditions change, but at a minimum every six months, for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Plan documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Plan documentation in the Accident Prevention Plan (APP).

#### 1.7.2.7 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSE/SAFE Z359.2, and include in the FP&P Plan and as part of the APP. Include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility.

#### 1.7.2.8 Hazardous Energy Control Program (HECP)

Not applicable

#### 1.7.2.9 Excavation Plan

Not applicable

#### [1.7.2.10 Occupant Protection Plan

Not applicable

#### ] [1.7.2.11 Asbestos Hazard Abatement Plan

Not applicable

#### ] [1.7.2.12 Site Safety and Health Plan

Identify the safety and health aspects, and prepare in accordance with Section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES.

#### ] [1.7.2.13 PCB Plan

Not applicable

## ][1.7.2.14 Site Demolition Plan

Not applicable

## ]1.8 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least 15 working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

## 1.8.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

## 1.8.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

## 1.9 DISPLAY OF SAFETY INFORMATION

## 1.9.1 Safety Bulletin Board

Within one calendar day(s) after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, may be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, Section 01.A.07. Additional items required to be posted include:

b. Hot work permit.

1.9.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

- a. Date deficiency identified;
- b. Description of deficiency;
- c. Name of person responsible for correcting deficiency;
- d. Projected resolution date;
- e. Date actually resolved.

1.10 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

1.11 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

1.12 NOTIFICATIONS and REPORTS

1.12.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, or any property damage. For LHE or rigging mishaps, notify the Contracting Officer as soon as practical but not more than 4 hours after mishap. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

Within notification include Contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the

Government's investigation(s) of any mishap.

#### 1.12.2 Accident Reports

- a. Conduct an accident investigation for recordable injuries and illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the applicable USACE Accident Report Form 3394, and provide the report to the Contracting Officer within 5 calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.
- b. Near Misses: For Army projects, report all "Near Misses" to the GDA, using local mishap reporting procedures, within 24 hrs. The Contracting Officer will provide the Contractor the required forms. Near miss reports are considered positive and proactive Contractor safety management actions.
- [ c. Conduct an accident investigation for any load handling equipment accident (including rigging accidents) to establish the root cause(s) of the accident. Complete the LHE Accident Report (Crane and Rigging Accident Report) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The Contracting Officer will provide a blank copy of the accident report form.

#### ]1.12.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

#### [1.12.4 Certificate of Compliance and Pre-lift Plan/Checklist for LHE and Rigging

Provide a FORM 16-1 Certificate of Compliance for LHE entering an activity under this contract and in accordance with EM 385-1-1. Post certifications on the crane.

Develop a Standard Lift Plan (SLP) in accordance with EM 385-1-1, Section 16.H.03 using Form 16-2 Standard Pre-Lift Crane Plan/Checklist for each lift planned. Submit SLP to the Contracting Officer for approval within 15 calendar days in advance of planned lift.

#### ]1.13 HOT WORK

##### 1.13.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the Fire Division. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. Provide at least two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance

with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Division phone number. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE FIRE DIVISION IMMEDIATELY.

#### 1.13.2 Work Around Flammable Materials

Obtain permit approval from a NFPA Certified Marine Chemist for "HOT WORK" within or around flammable materials (such as fuel systems or welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, or vaults) that have the potential for flammable or explosive atmospheres.

Whenever these materials, except beryllium and chromium (VI), are encountered in indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1, Section 06.H

#### 1.14 RADIATION SAFETY REQUIREMENTS

Submit License Certificates, employee training records, and Leak Test Reports for radiation materials and equipment to the Contracting Officer and Radiation Safety Office (RSO) for all specialized and licensed material and equipment proposed for use on the construction project (excludes portable machine sources of ionizing radiation including moisture density and X-Ray Fluorescence (XRF)). Maintain on-site records whenever licensed radiological materials or ionizing equipment are on government property.

Protect workers from radiation exposure in accordance with 10 CFR 20, ensuring any personnel exposures are maintained As Low As Reasonably Achievable.

##### 1.14.1 Radiography Operation Planning Work Sheet

Not applicable

##### 1.14.2 Site Access and Security

Not applicable

##### 1.14.3 Loss or Release and Unplanned Personnel Exposure

Not applicable

##### 1.14.4 Site Demarcation and Barricade

Not applicable

##### 1.14.5 Security of Material and Equipment

Not applicable

1.14.6 Transportation of Material

Not applicable

1.14.7 Schedule for Exposure or Unshielding

Not applicable

1.14.8 Transmitter Requirements

Not applicable

1.15 CONFINED SPACE ENTRY REQUIREMENTS

Not applicable

1.15.1 Entry Procedures

Not applicable

1.15.2 Forced Air Ventilation

Not applicable

1.15.3 Sewer Wet Wells

Not applicable

1.15.4 Rescue Procedures and Coordination with Local Emergency Responders

Not applicable

1.16 DIVE SAFETY REQUIREMENTS

Not applicable

1.17 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

- a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety

glasses must be worn or carried/available on each person. Mandatory PPE includes:

- a. Hard Hat
- b. Long Pants
- c. Appropriate Safety Shoes
- d. Appropriate Class Reflective Vests

#### 3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. An employee check-in/check-out communication procedure must be developed to ensure employee safety.

#### 3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

#### 3.1.3 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to FAR 52.243-4, "Changes" and FAR 52.236-2, "Differing Site Conditions."

#### 3.2 PRE-OUTAGE COORDINATION MEETING

Not applicable

### 3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Not applicable

### 3.4 FALL PROTECTION PROGRAM

Establish a fall protection program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify roles and responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures in accordance with ASSE/SAFE Z359.2 and EM 385-1-1, Sections 21.A and 21.D.

#### 3.4.1 Training

Institute a fall protection training program. As part of the Fall Protection Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection in accordance with EM 385-1-1, Section 21.C. Document training and practical application of the competent person in accordance with EM 385-1-1, Section 21.C.04 and ASSE/SAFE Z359.2 in the AHA.

#### 3.4.2 Fall Protection Equipment and Systems

Enforce use of personal fall protection equipment and systems designated (to include fall arrest, restraint, and positioning) for each specific work activity in the Site Specific Fall Protection and Prevention Plan and AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21.

Provide personal fall protection equipment, systems, subsystems, and components that comply with EM 385-1-1 Section 21.I, 29 CFR 1926.500 Subpart M, ASSE/SAFE Z359.0, ASSE/SAFE Z359.1, ASSE/SAFE Z359.2, ASSE/SAFE Z359.3, ASSE/SAFE Z359.4, ASSE/SAFE Z359.6, ASSE/SAFE Z359.7, ASSE/SAFE Z359.11, ASSE/SAFE Z359.12, ASSE/SAFE Z359.13, ASSE/SAFE Z359.14, and ASSE/SAFE Z359.15.

##### 3.4.2.1 Additional Personal Fall Protection

In addition to the required fall protection systems, other protection such as safety skiffs, personal floatation devices, and life rings, are required when working above or next to water in accordance with EM 385-1-1, Sections 21.0 through 21.0.06. Personal fall protection systems and equipment are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall protection systems are required when operating other equipment such as scissor lifts. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, travel, or while performing work.

##### 3.4.2.2 Personal Fall Protection Harnesses

Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. The use of body belts is not acceptable. Harnesses must have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Snap hooks and carabiners must be self-closing and self-locking, capable of

being opened only by at least two consecutive deliberate actions and have a minimum gate strength of 3,600 lbs in all directions. Use webbing, straps, and ropes made of synthetic fiber. The maximum free fall distance when using fall arrest equipment must not exceed 6 feet, unless the proper energy absorbing lanyard is used. Always take into consideration the total fall distance and any swinging of the worker (pendulum-like motion), that can occur during a fall, when attaching a person to a fall arrest system. All full body harnesses must be equipped with Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance in accordance with EM 385-1-1, Section 21.I.06.

#### 3.4.3 Fall Protection for Roofing Work

Not applicable

#### 3.4.4 Horizontal Lifelines (HLL)

Not applicable

#### 3.4.5 Guardrails and Safety Nets

Not applicable

#### 3.4.6 Rescue and Evacuation Plan and Procedures

When personal fall arrest systems are used, ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue or assisted-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP). The plan must comply with the requirements of EM 385-1-1, ASSE/SAFE Z359.2, and ASSE/SAFE Z359.4.

### 3.5 WORK PLATFORMS

#### 3.5.1 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Comply with the following requirements:

- a. Scaffold platforms greater than 20 feet in height must be accessed by use of a scaffold stair system.
- b. Ladders commonly provided by scaffold system manufacturers are prohibited for accessing scaffold platforms greater than 20 feet maximum in height.
- c. An adequate gate is required.
- d. Employees performing scaffold erection and dismantling must be qualified.
- e. Scaffold must be capable of supporting at least four times the maximum

intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan.

- f. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.
- g. Special care must be given to ensure scaffold systems are not overloaded.
- h. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to 4 times the width of the smallest dimension of the scaffold base.
- i. Scaffolding other than suspended types must bear on base plates upon wood mudsills (2 in x 10 in x 8 in minimum) or other adequate firm foundation.
- j. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than 6 feet.
- k. Delineate fall protection requirements when working above 6 feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

### 3.5.2 Elevated Aerial Work Platforms (AWPs)

Not applicable

## 3.6 EQUIPMENT

### 3.6.1 Material Handling Equipment (MHE)

Not applicable

### 3.6.2 Load Handling Equipment (LHE)

The following requirements apply. In exception, these requirements do not apply to commercial truck mounted and articulating boom cranes used solely to deliver material and supplies (not prefabricated components, structural steel, or components of a systems-engineered metal building) where the lift consists of moving materials and supplies from a truck or trailer to the ground; to cranes installed on mechanics trucks that are used solely in the repair of shore-based equipment; to crane that enter the activity but are not used for lifting; nor to other machines not used to lift loads suspended by rigging equipment. However, LHE accidents occurring during such operations must be reported.

- a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.
- b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated. Contractor's operator must remain with the crane during the spot check. Rigging gear must comply with OSHA, ASME B30.9 Standards[ and host country] safety standards.
- c. Comply with the LHE manufacturer's specifications and limitations for

erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

- d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, ASME B30.8 for floating cranes and floating derricks, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.
- e. When operating in the vicinity of overhead transmission lines, operators and riggers must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.
- f. Do not use crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.
- g. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.
- h. All employees must keep clear of loads about to be lifted and of suspended loads, except for employees required to handle the load.
- i. Use cribbing when performing lifts on outriggers.
- j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.
- k. A physical barricade must be positioned to prevent personnel access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.
- l. Maintain inspection records in accordance by EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.
- m. Maintain written reports of operational and load testing in accordance with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.
- n. Certify that all LHE operators have been trained in proper use of all safety devices (e.g. anti-two block devices).
- o. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. At wind speeds greater than 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated

capacity if applicable. Include this maximum wind speed determination as part of the activity hazard analysis plan for that operation.

### 3.6.3 Machinery and Mechanized Equipment

- a. Proof of qualifications for operator must be kept on the project site for review.
- b. Manufacture specifications or owner's manual for the equipment must be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.

### 3.6.4 Base Mounted Drum Hoists

Not applicable

### 3.6.5 Use of Explosives

Not applicable

## 3.7 EXCAVATIONS

Not applicable

### 3.7.1 Utility Locations

Not applicable

### 3.7.2 Utility Location Verification

Not applicable

### 3.7.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Not applicable

## 3.8 ELECTRICAL

Not applicable

### 3.8.1 Conduct of Electrical Work

Not applicable

### 3.8.2 Qualifications

Not applicable

### 3.8.3 Arc Flash

Not applicable

### 3.8.4 Grounding

Not applicable

3.8.5 Testing

Not applicable

-- End of Section --

## SECTION 01 35 29.13

HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES  
11/15

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z358.1 (2014) American National Standard for  
Emergency Eyewash and Shower Equipment

## NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH 85-115 (1985) Occupational Safety and Health  
Guidance Manual for Hazardous Waste Site  
Activities

## U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety and Health Requirements  
Manual

ER 385-1-92 (2007) Safety and Occupational Health  
Requirements for Hazardous, Toxic, and  
Radioactive Waste (HTRW) Activities

## U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1904 Recording and Reporting Occupational  
Injuries and Illnesses

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926 Safety and Health Regulations for  
Construction

49 CFR 171 General Information, Regulations, and  
Definitions

## 1.2 PRECONSTRUCTION SAFETY CONFERENCE

Conduct a preconstruction safety conference prior to the start of site activities and after submission of the Accident Prevention Plan/Site Safety And Health Plan (APP/SSHP). The objective of the meeting is to discuss health and safety concerns related to the impending work, discuss project health and safety organization and expectations, review and answer comments and concerns regarding the APP/SSHP or other health and safety concerns. Ensure that those individuals responsible for health and safety at the project level are available and attend this meeting.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Work Zones; G[, [\_\_\_\_]]

#### SD-03 Product Data

Amendments to the APP/SSHP  
Exposure Monitoring/Air Sampling Program  
Site Control Log  
SSHO's Daily Inspection Logs

#### SD-07 Certificates

Certificate Of Worker/Visitor Acknowledgement

#### SD-11 Closeout Submittals

Safety And Health Phase-Out Report

### 1.4 ACCIDENT PREVENTION PLAN/SITE SAFETY AND HEALTH PLAN (APP/SSHP)

Develop and implement a Site Safety and Health Plan in accordance with Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS, and attach to the Accident Prevention Plan (APP) as an appendix (APP/SSHP). Address all occupational safety and health hazards (traditional construction as well as contaminant-related hazards) associated with cleanup operations within the APP/SSHP. Cover each SSHP element in sections 28.A.01 and 33.B of EM 385-1-1 and each APP element in Appendix A of EM 385-1-1. There are overlapping elements in Section 28.A.01 and Appendix A of EM 385-1-1. SSHP appendix elements that overlap with APP elements need not be duplicated in the APP/SSHP provided each safety and occupational health (SOH) issue receives adequate attention and is documented in the APP/SSHP. The APP/SSHP is a dynamic document, subject to change as project operations/execution change. Modify the APP/SSHP to address changing and previously unidentified health and safety conditions. Ensure that the APP/SSHP is updated accordingly. Submit [amendments to the APP/SSHP](#) to the Contracting Officer as the APP/SSHP is updated. For long duration projects resubmit the APP/SSHP to the Contracting Officer annually for review. The APP/SSHP must contain all updates.

#### 1.4.1 Acceptance and Modifications

Prior to submittal, the APP/SSHP must be signed and dated by the Safety and Health Manager and the Site Superintendent. Submit for review 15 days prior to the Preconstruction Safety Conference. Deficiencies in the APP/SSHP will be discussed at the preconstruction safety conference, and must be revised to correct the deficiencies and resubmitted for

acceptance. Onsite work must not begin until the plan has been accepted. Maintain a copy of the written APP/SSHP onsite. Changes and modifications to the APP/SSHP must be made with the knowledge and concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Bring to the attention of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer any unforeseen hazard that becomes evident during the performance of the work, through the Site Safety and Health Officer (SSHO) for resolution as soon as possible. In the interim, take necessary action to re-establish and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Disregard for the provisions of this specification or the accepted APP/SSHP is cause for stopping work until the matter has been rectified.

#### 1.4.2 Availability

Make available the APP/SSHP in accordance with 29 CFR 1910.120, (b)(1)(v) and 29 CFR 1926.65, (b)(1)(v).

#### 1.5 STAFF ORGANIZATION, QUALIFICATION AND RESPONSIBILITIES

Provide hazardous waste operations and emergency response organization in accordance with EM 385-1-1, Section 33.

##### 1.5.1 Safety and Health Manager

Safety and Health Manager must be [an Industrial Hygienist certified by the American Board of Industrial Hygiene] [a safety professional certified by the Board of Certified Safety Professionals] [a health physicist certified by the American Board of Health Physicists].

Apply the following in conjunction with the required qualifications and responsibilities stated in EM 385-1-1, Section 33.C.01.

##### 1.5.1.1 Additional Qualifications

The Safety and Health Manager must have the following qualifications:

- a. A minimum of 3 years experience in developing and implementing safety and occupational health programs [at HTRW sites] [in the HTRW disposal industry] [in the chemical industry] [in the petroleum processing industry] [at underground storage tank removal projects].
- b. Documented experience in supervising professional and technician level personnel.
- c. Documented experience in developing worker exposure assessment programs and air monitoring programs and techniques.
- d. Documented experience in managing personal protective equipment (PPE) programs and conducting PPE hazard evaluations for the types of activities and hazards likely to be encountered on the project.
- e. Working knowledge of state and Federal occupational safety and health regulations.

#### 1.5.1.2 Responsibilities and Duties

- a. Development, implementation, oversight, and enforcement of the APP/SSHP.
- b. Provide onsite consultation as needed to ensure the APP/SSHP is fully implemented.
- c. Conduct initial site-specific training.
- d. Be available for consultation during the first 3 days of remedial activities and at the startup of each new major phase of work.
- e. Visit the site as needed and at least once per week for the duration of activities, to audit the effectiveness of the APP/SSHP.
- f. Be available for emergencies.
- g. Coordinate any modifications to the APP/SSHP with the Site Superintendent, the SSHO, and the Contracting Officer.
- h. Be responsible for evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE.
- i. Provide continued support for upgrading/downgrading of the level of personal protection.
- j. Serve as a member of the quality control staff.
- k. Review accident reports and results of daily inspections.
- l. Sign and date the APP/SSHP prior to submittal.

#### 1.5.2 Site Safety and Health Officer

Designate an individual and one alternate as the Site Safety and Health Officer (SSHO). Include the name, qualifications (education and training summary and documentation), and work experience of the Site Safety and Health Officer and [alternate][alternates] in the APP/SSHP.

The Apply the following in conjunction with the required qualifications and responsibilities stated in EM 385-1-1, Section 33.C.02.

##### 1.5.2.1 Qualifications

Not Applicable.

##### 1.5.2.2 Responsibilities and Duties

The following requirements are in addition to those in Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.

- a. Assist and represent the Safety and Health Manager in onsite training and the day to day onsite implementation and enforcement of the accepted APP/SSHP.
- b. Be assigned to the site on a full time basis for the duration of field activities. The SSHO can have collateral duties in addition to SOH related duties.

- c. Have authority to stop work if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.
- d. Have authority to ensure site compliance with specified SOH requirements, Federal, state and OSHA regulations and all aspects of the APP/SSHP including, but not limited to, activity hazard analyses, air monitoring, monitoring for ionizing radiation, use of PPE, decontamination, site control, standard operating procedures used to minimize hazards, safe use of engineering controls, the emergency response plan, confined space entry procedures, spill containment program, and preparation of records by performing a daily SOH inspection and documenting results on the Daily Safety Inspection Log in accordance with 29 CFR 1904.
- e. In coordination with site management and the Safety and Health Manager, recommend corrective actions for identified deficiencies and oversee the corrective actions.
- f. Consult with and coordinate any modifications to the APP/SSHP with the Safety and Health Manager, the Site Superintendent, and the Contracting Officer.
- g. Conduct daily safety inspection and document SOH findings into the Daily Safety Inspection Log. Track noted SOH deficiencies to ensure that they are corrected.
- h. Conduct accident investigations and prepare accident reports.
- i. Serve as a member of the quality control staff on matters relating to SOH.

#### 1.5.3 Additional Certified Health and Safety Support Personnel

Not applicable

#### 1.5.4 Occupational Physician

Not applicable

#### 1.5.5 Persons Certified in First Aid and CPR

At least two persons who are currently certified in first aid and CPR by the American Red Cross or other approved agency must be onsite at all times during site operations. They must be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030. These persons may perform other duties but must be immediately available to render first aid when needed.

#### 1.5.6 Safety and Health Technicians

Not applicable

### 1.6 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

Develop and implement an Emergency Response Plan, that meets the requirements of EM 385-1-1 Section 33.G, 29 CFR 1910.120 (1) and 29 CFR 1926.65 (1), as a section of the APP/SSHP. In the event of any emergency associated with remedial action, without delay, alert all onsite

employees and as necessary offsite emergency responders that there is an emergency situation; take action to remove or otherwise minimize the cause of the emergency; alert the Contracting Officer; and institute measures necessary to prevent repetition of the conditions or actions leading to, or resulting in, the emergency. Train employees that are required to respond to hazardous emergency situations to their level of responsibility according to 29 CFR 1910.120 (q) and 29 CFR 1926.65 (q) requirements. Rehearse the plan regularly as part of the overall training program for site operations. Review the plan periodically and revised as necessary to reflect new or changing site conditions or information. Provide copies of the Emergency Response Portion of the accepted APP/SSHP to the affected local emergency response agencies. Address, as a minimum, the following elements in the plan:

- a. Pre-emergency planning. Coordinate with local emergency response providers during preparation of the Emergency Response Plan. At a minimum, coordinate with local fire, rescue, hazardous materials response teams, police and emergency medical providers to assure all organizations are capable and willing to respond to and provide services for on-site emergencies. Ensure the Emergency Response Plan for the site is compatible and integrated with the local fire, rescue, medical and police security services available from local emergency response planning agencies.
- b. Personnel roles, lines of authority, communications for emergencies.
- c. Emergency recognition and prevention.
- d. Site topography, layout, and prevailing weather conditions.
- e. Criteria and procedures for site evacuation (emergency alerting procedures, employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security and control).
- f. Route maps to nearest prenotified medical facility. Site-support vehicles must be equipped with maps. At the beginning of project operations, drivers of the support vehicles must become familiar with the emergency route and the travel time required.
- g. Specific procedures for decontamination and medical treatment of injured personnel.
- h. Emergency alerting and response procedures including posted instructions and a list of names and telephone numbers of emergency contacts (physician, nearby medical facility, fire and police departments, ambulance service, Federal, state, and local environmental agencies; as well as Safety and Health Manager, the Site Superintendent, the Contracting Officer and their alternates).
- i. Criteria for initiating community alert program, contacts, and responsibilities.
- j. Procedures for reporting incidents to appropriate government agencies. In the event that an incident such as an explosion or fire, or a spill or release of toxic materials occurs during the course of the project, the appropriate government agencies must be immediately notified. In addition, verbally notify the Contracting Officer and the local district safety office immediately and submit a written

notification within 24 hours. Include within the report the following items:

- (1) Name, organization, telephone number, and location of the Contractor.
- (2) Name and title of the person(s) reporting.
- (3) Date and time of the incident.
- (4) Location of the incident, i.e., site location, facility name.
- (5) Brief summary of the incident giving pertinent details including type of operation ongoing at the time of the incident.
- (6) Cause of the incident, if known.
- (7) Casualties (fatalities, disabling injuries).
- (8) Details of any existing chemical hazard or contamination.
- (9) Estimated property damage, if applicable.
- (10) Nature of damage, effect on contract schedule.
- (11) Action taken to ensure safety and security.
- (12) Other damage or injuries sustained, public or private.

k. Procedures for critique of emergency responses and follow-up.

#### 1.7 CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGEMENT

A copy of a [certificate of worker/visitor acknowledgement](#) must be completed and submitted for each visitor allowed to enter contamination reduction or exclusion zones, and for each employee, following the Example Certificate Of Worker/Visitor Acknowledgement at the end of this section.

#### 1.8 INSPECTIONS

Attach to and submit with the Daily Quality Control reports the [SSHO's Daily Inspection Logs](#). Include with each entry the following: date, work area checked, employees present in work area, PPE and work equipment being used in each area, special SOH issues and notes, and signature of preparer.

#### 1.9 SAFETY AND HEALTH PHASE-OUT REPORT

Submit a [Safety and Health Phase-Out Report](#) in conjunction with the project close out report, prior to final acceptance of the work. Include the following minimum information :

- a. Summary of the overall performance of SOH (e.g., accidents or incidents including near misses, unusual events, lessons learned).
- b. Final decontamination documentation including procedures and techniques used to decontaminate equipment, vehicles, and on site facilities.
- c. Summary of exposure monitoring and air sampling accomplished during

the project.

- d. Signatures of Safety and Health Manager and SSHO.

## PART 2 PRODUCTS

### 2.1 REGULATORY REQUIREMENTS

Comply with EM 385-1-1, 29 CFR 1926.65, 29 CFR 1910.120, OSHA requirements in 29 CFR 1910 and 29 CFR 1926 with work performed under this contract, and state specific OSHA requirements where applicable. Submit to the Contracting Officer for resolution matters of interpretation of standards before starting work. The most stringent requirements apply where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary.

### 2.2 PERSONAL PROTECTIVE EQUIPMENT

#### 2.2.1 Site Specific PPE Program

Not applicable

#### 2.2.2 Levels of Protection

The Safety and Health Manager must establish and evaluate as the work progresses the levels of protection for each work activity. Also establish action levels for upgrade or downgrade in levels of PPE. Describe in the SSHP the protocols and the communication network for changing the level of protection. Address air monitoring results, potential for exposure, changes in site conditions, work phases, job tasks, weather, temperature extremes, and individual medical considerations within the PPE evaluation protocol.

##### 2.2.2.1 Initial PPE Components

Not applicable

##### 2.2.3 PPE for Government Personnel

Not applicable

### 2.3 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

Maintain, as a minimum, the following items onsite and available for immediate use:

- a. First aid equipment and supplies approved by the consulting physician.
- b. Emergency eyewashes and showers that comply with ANSI/ISEA Z358.1.
- d. Provide fire extinguishers of sufficient size and type at site facilities and in all vehicles and at any other site locations where flammable or combustible materials present a fire risk.

[  
e. .]

## PART 3 EXECUTION

## 3.1 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

## 3.1.1 Project/Site Conditions

Refer to the following reports and information for the site description and contamination characterization. They are located at [\_\_\_\_\_].

## 3.1.1.1 UST Documents

Not Applicable.

## 3.1.2 Ordnance and Explosives (OE)

Establish the site Munitions and Explosives of Concern (MEC) probability assessment prior to starting work in accordance with EM 385-1-97 and ER 385-1-92. Produce a probability assessment to establish the MEC support requirements. Brief personnel on Recognize, Retreat and Report (3R's) and the POC list. EM 385-1-97, Chapter 1 provides follow-on actions necessary before going back to work status.

Stop work and contact the Contracting Officer if ordnance and explosives (OE), explosive media or chemical agent contaminated media (CACM) are discovered during HTRW site cleanup activities. Proceed with work after the Contracting Officer gives permission and, according to ER 385-1-95 requirements.

## 3.2 TASK SPECIFIC HAZARDS, INITIAL PPE, HAZWOPER MEDICAL SURVEILLANCE AND TRAINING APPLICABILITY

Task specific occupational hazards, task specific HAZWOPER medical surveillance and training applicability and task specific initial PPE requirements for the project are listed on the Task Hazard and Control Sheets at the end of this section. Reevaluate occupational safety and health hazards as the work progresses and to adjust the PPE and onsite operations, if necessary, so that the work is performed safely and in compliance with occupational safety and health regulations.

## 3.3 TRAINING

In conjunction with EM 385-1-1, Section 33D, meet the training program requirements for workers performing cleanup operations and who will be exposed to contaminants.

## 3.3.1 General HTRW Operations Training

All Personnel performing duties with potential for exposure to onsite contaminants must meet and maintain the following 29 CFR 1910.120/ 29 CFR 1926.65 (e) training requirements:

- a. 40 hours of off site HTRW instruction.
- b. 3 days actual on-the-job field experience under the direct supervision of a trained, experienced supervisor.
- c. 8 hours refresher training annually.

Onsite supervisors must have an additional 8 hours management and

supervisor training specified in 29 CFR 1910.120/29 CFR 1926.65 (e) (4).

### 3.3.2 Pre-Entry Briefing

Prior to commencement of onsite field activities, all site employees, including those assigned only to the Support Zone, must attend a site-specific SOH training session. This session will be conducted by the Safety and Health Manager and the Site Safety and Health Officer to ensure that all personnel are familiar with requirements and responsibilities for maintaining a safe and healthful work environment. Thoroughly discuss procedures and contents of the accepted APP/SSHP and Sections 01.B.02 and 28.D.03 of EM 385-1-1. Each employee must sign a training log to acknowledge attendance and understanding of the training. Notify the Contracting Officer at least 5 days prior to the initial site-specific training session so government personnel involved in the project may attend.

### 3.3.3 Periodic Sessions

Conduct periodic onsite training by the SSHO at least [weekly] [daily] for personnel assigned to work at the site during the following [week] [day]. Address SOH procedures, work practices, any changes in the APP/SSHP, activity hazard analyses, work tasks, or schedule; results of previous week's air monitoring, review of safety discrepancies and accidents. Convene a meeting prior to implementation of the change should an operational change affecting onsite field work be made, to explain SOH procedures. Conduct a site-specific training sessions for new personnel, visitors, and suppliers by the SSHO using the training curriculum outlines developed by the Safety and Health Manager. Each employee must sign a training log to acknowledge attendance and understanding of the training.

### 3.3.4 Other Training

Not applicable

## 3.4 MEDICAL SURVEILLANCE PROGRAM

Not applicable

## 3.5 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Not applicable

## 3.6 HEAT STRESS MONITORING AND MANAGEMENT

Document in the APP/SSHP and implement the procedures and practices in section 06.J. in EM 385-1-1 to monitor and manage heat stress.

## 3.7 SPILL AND DISCHARGE CONTROL

Develop and implement written spill and discharge containment/control procedures. Address radioactive wastes, shock sensitive wastes, laboratory waste packs, material handling equipment, as well as drum and container handling, opening, sampling, shipping and transport. Describe prevention measures, such as building berms or dikes; spill control measures and material to be used (e.g. booms, vermiculite); location of the spill control material; personal protective equipment required to cleanup spills; disposal of contaminated material; and who is responsible to report the spill. Storage of contaminated material or hazardous

materials must be appropriately bermed, diked and contained to prevent any spillage of material on uncontaminated soil. If the spill or discharge is reportable, or human health or the environment are threatened, notify the National Response Center, the state, and the Contracting Officer as soon as possible. Provide control as required by Section 01 57 19 TEMPORARY ENVIRONMENT CONTROLS. Reporting requirements must be in accordance with [Section 02 65 00 UNDERGROUND STORAGE TANK REMOVAL][\_\_\_\_\_].

### 3.8 MATERIALS TRANSFER SAFETY

Remove liquids and residues from the tanks using explosion-proof or air-driven pumps. In accordance with EM 385-1-1, Section 9, electrically bond the tank and ground pump motors and suction hoses to prevent electrostatic ignition hazards. Use of a hand pump will be permitted to remove the last of the liquid from the bottom of the tanks. If a vacuum truck is used for removal of liquids or residues, the area of operation for the vacuum truck must be vapor free. locate the truck upwind from the tank and outside the path of probable vapor travel. Discharge the vacuum pump exhaust gases through a hose of adequate size and length downwind of the truck and tank area. Vacuum truck operating and safety practices must conform to API RP 2219. Collect tank residues in drums, tanks, or tank trucks labeled according to 49 CFR 171 and 49 CFR 172 and disposed of as specified. Disconnect and drain fittings and lines of their contents after the materials have been transferred and the tanks have been exposed. Do not spill contents into the environment during cutting or disconnecting of tank fittings. Transfer materials drained into DOT-approved drums for storage and transportation. Use only non-sparking or non-heat producing tools to disconnect and drain or to cut through tank fittings. Electrical equipment (e.g., pumps, portable hand tools) used for tank preparation must be explosion-proof. Following cutting or disconnecting of the fittings, plug openings leading to the tanks.

### 3.9 SITE CONTROL MEASURES

Coordinate site control measures with Section 01 57 19 TEMPORARY ENVIRONMENT CONTROLS.

#### 3.9.1 Work Zones

Initial anticipated work zone boundaries (exclusion zone, contamination reduction zone, support zone, all access points and decontamination areas) are to be clearly delineated on the site drawings. Base delineation of work zone boundaries on the contamination characterization data and the hazard/risk analysis to be performed as described in EM 385-1-1 06.A.02. As work progresses and field conditions are monitored, work zone boundaries may be modified (and site drawings modified) with approval of the Contracting Officer. Clearly identify work zones and mark in the field (using fences, tape, or signs). Submit and post a site map, showing work zone boundaries and locations of decontamination facilities in the onsite office. Work zones must consist of the following:

##### 3.9.1.1 Exclusion Zone (EZ)

The exclusion zone is the area where hazardous contamination is either known or expected to occur and the greatest potential for exposure exists. Control entry into this area and exit may only be made through the Contamination Reduction Zone (CRZ).

#### 3.9.1.2 Contamination Reduction Zone (CRZ)

The CRZ is the transition area between the Exclusion Zone and the Support Zone. The personnel and equipment decontamination areas must be separate and unique areas located in the CRZ.

#### 3.9.1.3 Support Zone (SZ)

The Support Zone is defined as areas of the site, other than exclusion zones and contamination reduction zones, where workers do not have the potential to be exposed to hazardous substances or dangerous conditions resulting from HTRW operations. Secure the Support Zone against active or passive contamination. Site offices, parking areas, and other support facilities must be located in the Support Zone.

#### 3.9.2 Site Control Log

A log of personnel visiting, entering, or working on the site must be maintained. Include the following: date, name, agency or company, time entering and exiting site, time entering and exiting the exclusion zone (if applicable). Before visitors are allowed to enter the Contamination Reduction Zone or Exclusion Zone, they must show proof of current training, medical surveillance and respirator fit testing (if respirators are required for the tasks to be performed) and fill out a Certificate of Worker or Visitor Acknowledgment. Record this visitor information, including date, in the log.

#### 3.9.3 Communication

Provide and install an employee alarm system that has adequate means of on and off site communication in accordance with 29 CFR 1910 Section .165. The means of communication must be able to be perceived above ambient noise or light levels by employees in the affected portions of the workplace. The signals must be distinctive and recognizable as messages to evacuate or to perform critical operations.

#### 3.9.4 Site Security

Provide the following site security: **Enclose and barricade work areas and secure fencing**. Print signs in bold large letters on contrasting backgrounds. Signs must be visible from all points where entry might occur and at such distances from the restricted area that employees may read the signs and take necessary protective steps before entering.

### 3.10 PERSONAL HYGIENE AND DECONTAMINATION

Personnel entering the Exclusion or Contamination Reduction Zones or otherwise exposed to hazardous chemical vapors, gases, liquids, or contaminated solids must decontaminate themselves and their equipment prior to exiting the contamination reduction zone (CRZ) and entering the support zone. Consult Chapter 10.0 of NIOSH 85-115 when preparing decontamination procedures. Submit a detailed discussion of personal hygiene and decontamination facilities and procedures to be followed by site workers as part of the APP/SSHP. Train employees in the procedures and enforce the procedures throughout site operations.

#### 3.10.1 Decontamination Facilities

Submit drawings showing the layout of the personnel and equipment

decontamination [areas] [facilities].

### 3.10.2 Personnel Decontamination

Initially set up a decontamination line in the CRZ. Employees must exit the exclusion zone through the CRZ and implement the following decontamination procedures and techniques: [Scrub and rinse water proof outer garments] [remove all outer garments] [hand and face wash] [shower]. Showers, if needed, must comply with 29 CFR 1910, Section.141 and EM 385-1-1, 02 F, Washing Facilities. Following are additional decontamination procedures personnel are to follow: [\_\_\_\_\_]. It is the Site Safety and Health Officer's responsibility to recommend techniques to improve personnel decontamination procedures, if necessary. Initial personnel decontamination equipment includes the following: [\_\_\_\_\_].

### 3.10.3 Equipment Decontamination

Decontaminate the vehicles and equipment used in the EZ in the CRZ prior to leaving the EZ.

#### 3.10.3.1 Facilities for Equipment and Personnel

Provide a [vehicle][/][equipment] decontamination station within the CRZ for decontaminating vehicles and equipment leaving the EZ. [Construct a decontamination station pad, which meets the site decontamination needs for all vehicles and larger equipment decontamination. Construct the pad to capture decontamination water, including overspray, and allow for collection and removal of the decontamination water using sumps, dikes and ditches as required.] [Provide a high pressure, low volume, water wash area for equipment and vehicles.] [Provide a steam cleaning system for use after the mud or site material has been cleaned from the equipment.] [Perform dry decontamination using a broom to remove dry/loose spilled materials on accessible surfaces.] [Provide a designated "clean area" in the CRZ for performing equipment maintenance. Use this area when personnel are required by normal practices to come in contact with the ground, i.e., crawling under a vehicle to change engine oil. Equipment within the EZ or CRZ must be decontaminated before maintenance is performed.]

#### 3.10.3.2 Procedures

Procedures for equipment decontamination must be developed and utilized to prevent the spread of contamination into the SZ and offsite areas. These procedures must address disposal of contaminated products and spent materials used on the site, including, as a minimum, containers, fluids, and oils. Assume any item taken into the EZ to be contaminated and perform an inspection and decontaminate. Vehicles, equipment, and materials must be cleaned and decontaminated prior to leaving the site. Handle construction material in such a way as to minimize the potential for contaminants being spread or carried offsite. Prior to exiting the site, vehicles and equipment must be monitored to ensure the adequacy of decontamination.

Task Hazard and Control Requirements Sheet	
Task	
Initial Anticipated Hazards	
Initial PPE	
Initial Controls	
Initial Exposure Monitoring	
[Yes][No]	HAZWOPER Medical Surveillance Required
[Yes][No]	HAZWOPER Training Required

-- End of Section --

## SECTION 01 42 00

## SOURCES FOR REFERENCE PUBLICATIONS

11/14

## PART 1 GENERAL

## 1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g. ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

## 1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

AACE INTERNATIONAL (AACE)  
1265 Suncrest Towne Centre Drive  
Morgantown, WV 26505-1876 USA  
Ph: 304-296-8444  
Fax: 304-291-5728  
E-mail: [info@aacei.org](mailto:info@aacei.org)  
Internet: <http://www.aacei.org>

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)  
38800 Country Club Drive  
Farmington Hills, MI 48331-3439  
Ph: 248-848-3700  
Fax: 248-848-3701  
E-mail: [bkstore@concrete.org](mailto:bkstore@concrete.org)  
Internet: <http://www.concrete.org>

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)  
1330 Kemper Meadow Drive  
Cincinnati, OH 45240  
Ph: 513-742-2020 or 513-742-6163  
Fax: 513-742-3355  
E-mail: [mail@acgih.org](mailto:mail@acgih.org)  
Internet: <http://www.acgih.org>

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)  
3141 Fairview Park Dr, Suite 777  
Falls Church, VA 22042  
Tel: 703-849-8888  
Fax: 703-207-3561  
E-mail: [infonet@aiha.org](mailto:infonet@aiha.org)  
Internet: <http://www.aiha.org>

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)  
One East Wacker Drive, Suite 700  
Chicago, IL 60601-1802  
Ph: 312-670-2400  
Fax: 312-670-5403  
Bookstore: 800-644-2400  
E-mail: [aisc@ware-pak.com](mailto:aisc@ware-pak.com)  
Internet: <http://www.aisc.org>

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)  
P.O. Box 28518  
1711 Arlingate Lane  
Columbus, OH 43228-0518  
Ph: 800-222-2768; 614-274-6003  
Fax: 614-274-6899  
E-mail: [tjones@asnt.org](mailto:tjones@asnt.org)  
Internet: <http://www.asnt.org>

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)  
1800 East Oakton Street  
Des Plaines, IL 60018  
Ph: 847-699-2929  
Internet: <http://www.asse.org>

AMERICAN WELDING SOCIETY (AWS)  
13301 NW 47 Ave  
Miami, FL 33054

Ph: 888-WELDING, 305-824-1177, 305-826-6192  
Fax: 305-826-6195  
E-mail: [customer.service@awspubs.com](mailto:customer.service@awspubs.com)  
Internet: <http://www.aws.org>

ASME INTERNATIONAL (ASME)  
Two Park Avenue, M/S 10E  
New York, NY 10016-5990  
Ph: 800-843-2763  
Fax: 973-882-1717  
E-mail: [customercare@asme.org](mailto:customercare@asme.org)  
Internet: <http://www.asme.org>

ASTM INTERNATIONAL (ASTM)  
100 Barr Harbor Drive, P.O. Box C700  
West Conshohocken, PA 19428-2959  
Ph: 877-909-2786  
Internet: <http://www.astm.org>

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)  
933 North Plum Grove Road  
Schaumburg, IL 60173-4758  
Ph: 847-517-1200  
Fax: 847-517-1206  
Internet: <http://www.crsi.org/>

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)  
ISO Central Secretariat  
Chemin de Blandonnet 8  
CP 401 - 1214 Vernier, Geneva

Switzerland  
Ph: 41-22-749-01-11  
Fax: 41-22-733-34-30  
E-mail: central@iso.ch  
Internet: <https://www.iso.org/contact-iso.html>

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)  
1901 North Moore Street  
Arlington, VA 22209-1762  
Ph: 703-525-1695  
Fax: 703-528-2148  
Internet: <http://www.safetysafetyequipment.org/>

MASTER PAINTERS INSTITUTE (MPI)  
2800 Ingleton Avenue  
Burnaby, BC CANADA V5C 6G7  
Ph: 1-888-674-8937  
Fax: 1-888-211-8708  
E-mail: info@paintinfo.com or techservices@mpi.net  
Internet: <http://www.mpi.net/>

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)  
1 Batterymarch Park  
Quincy, MA 02169-7471  
Ph: 617-770-3000  
Fax: 617-770-0700  
Internet: <http://www.nfpa.org>

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)  
395 E Street, S.W.  
Suite 9200  
Patriots Plaza Building  
Washington, DC 20201  
Ph: 800-232-4636  
Fax: 513-533-8347  
E-mail: nioshdocket@cdc.gov  
Internet: <http://www.cdc.gov/niosh/>

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)  
100 Bureau Drive  
Stop 1070  
Gaithersburg, MD 20899-1070  
Ph: 301-975-NIST (6478)  
E-mail: inquiries@nist.gov  
Internet: <http://www.nist.gov>

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Manager, Customer Service  
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Silver Spring, MD 20910  
Ph: 240-485-1165  
E-mail: jjenkins@nrmca.org (Jacques Jenkins)  
Internet: <http://www.nrmca.org>

SOCIETY FOR PROTECTIVE COATINGS (SSPC)  
40 24th Street, 6th Floor  
Pittsburgh, PA 15222  
Ph: 412-281-2331

Fax: 412-281-9992  
E-mail: [info@sspc.org](mailto:info@sspc.org)  
Internet: <http://www.sspc.org>

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Philadelphia, PA 19111-5094  
Ph: 215-697-6396 - for account/password issues  
Internet: <http://assist.daps.dla.mil/online/start/>; account  
registration required  
Obtain Unified Facilities Criteria (UFC) from:  
Whole Building Design Guide (WBDG)  
National Institute of Building Sciences (NIBS)  
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Washington, DC 20005  
Ph: 202-289-7800  
Fax: 202-289-1092  
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HUD User  
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Washington, DC 20026-3268  
Ph: 800-245-2691 or 202-708-3178  
TDD: 800-927-7589  
Fax: 202-708-9981  
Internet: <http://www.huduser.org>

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)  
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1200 Pennsylvania Avenue, N.W.  
Washington, DC 20004  
Ph: 202-272-0167  
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Alexandria, VA 22312  
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Fax: 703-605-6900  
E-mail: [info@ntis.gov](mailto:info@ntis.gov)  
Internet: <http://www.ntis.gov>

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Internet: <http://www.gpoaccess.gov>

UNDERWRITERS LABORATORIES (UL)

2600 N.W. Lake Road

Camas, WA 98607-8542

Ph: 877-854-3577

E-mail: CEC.us@us.ul.com

Internet: <http://www.ul.com/>

UL Directories available through IHS at <http://www.ihs.com>

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

## SECTION 01 42 15

## METRIC MEASUREMENTS

02/14

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

## ASTM SI10

(2016) American National Standard for Use of the International System of Units (SI): The Modern Metric System

## 1.2 GENERAL

This project includes metric units of measurements. The metric units used are the International System of Units (SI) developed and maintained by the General Conference on Weights and Measures (CGPM); the name International System of Units and the international abbreviation SI were adopted by the 11th CGPM in 1960. When both metric and English inch-pound (I-P) measurements are included the specification may contain measurements for products that are manufactured to an industry recognized rounded metric (hard metric) dimensions but are allowed to be substituted by I-P products, to indicate industry and/or Government standards, test values or other controlling factors, such as the code requirements where I-P values are needed for clarity, or to trace back to the referenced standards, test values or codes.

## 1.3 USE OF MEASUREMENTS IN SPECIFICATIONS

Measurements in specifications are either in SI or I-P units as indicated, except as otherwise authorized. When only SI or I-P measurements are specified for a product, procure the product in the specified units (SI or I-P) unless otherwise authorized by the Contracting Officer. The Contractor is responsible for all associated labor and materials when authorized to substitute one system of units for another and for the final assembly and performance of the specified work and/or products.

## 1.3.1 Hard Metric

Hard metric measurements are often used for field data such as distance from one point to another or distance above the floor. Products are considered to be hard metric when they are manufactured to metric dimensions or have an industry recognized metric designation.

## 1.3.2 Soft Metric

- a. A soft metric measurement is a non-mathematical, industry related conversion. Soft metric measurements are used for measurements pertaining to products, test values, and other situations where the I-P units are the standard for manufacture, verification, or other

controlling factor.

- b. A soft metric measurement is also indicated for products that are manufactured in industry designated metric dimensions but are required by law to allow substitute I-P products.

#### 1.3.3 Neutral

A neutral measurement is indicated by an identifier which has no expressed relation to either an SI or an I-P value (e.g., American Wire Gage (AWG) which indicates thickness but in itself is neither SI nor I-P).

#### 1.4 COORDINATION

Bring discrepancies, such as mismatches or product unavailability, arising from use of both metric and non-metric measurements and discrepancies between the measurements in the specifications and the measurements in the drawings to the attention of the Contracting Officer for resolution.

#### 1.5 RELATIONSHIP TO SUBMITTALS

Submittals for Government approval or for information only covers the SI or I-P products actually being furnished for the project. Submit the required drawings and calculations in the same units used in the contract documents describing the product or requirement unless otherwise instructed or approved. Use [ASTM SI10](#) as the basis for establishing metric measurements required to be used in submittals.

-- End of Document --

## SECTION 01 45 00.00 10

QUALITY CONTROL  
11/16

## PART 1 GENERAL

## 1.1 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program. Include all associated costs in the applicable [Bid] [Pricing] Schedule item.

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

See the list of submittals in Section 01 11 00.

## SD-01 Preconstruction Submittals

Contractor Quality Control (CQC) Plan; G[, [\_\_\_\_]]

## SD-05 Design Data

Discipline-Specific Checklists  
Design Quality Control

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

## 3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system that complies with the Contract Clause titled "Inspection of Construction." QC consist of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system covers all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project

superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

### 3.2 CONTRACTOR QUALITY CONTROL (CQC) PLAN

Submit no later than [15 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The Government will consider an interim plan for the first 15 days of operation. will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

#### 3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction-operations, both onsite and offsite, including work by subcontractors fabricators, suppliers and purchasing agents:

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports to the project superintendent.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
- e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer are required to be used.)
- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
- g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
- h. Reporting procedures, including proposed reporting formats.
- i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of the specifications can generally be considered as a definable feature of work, there are

frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

### 3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in the Contractor Quality Control(CQC) Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

### 3.2.3 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

## 3.3 COORDINATION MEETING

After the before start of construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of [\_\_\_\_\_] calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations,, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There can be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

## 3.4 QUALITY CONTROL ORGANIZATION

### 3.4.1 Personnel Requirements

The requirements for the CQC organization are a Safety and Health Manager, CQC System Manager, and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization is

responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

#### 3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC System Manager is assigned as CQC System Manager but has duties as project superintendent in addition to quality control. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

#### 3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: **artifact preservation**.

Experience Matrix	
Area	Qualifications
Artifact Preservation	Graduate Civil Engineer or Construction Manager with 5 years experience in the type of work being performed on this project or technician with 5 yrs related experience

Experience Matrix	
Area	Qualifications
Submittals	Submittal Clerk with 1 year experience

#### 3.4.4 Additional Requirement

In addition to the above experience and education requirements, the Contractor Quality Control(CQC) System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Contractors course. If the CQC System Manager does not have a current certification, obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

The Construction Quality Management Training certificate expires after 5 years. If the CQC System Manager's certificate has expired, retake the course to remain current.

#### 3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

### 3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, have to comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 01 91 00.15 TOTAL BUILDING COMMISSIONING are included in the contract, the submittals required by those sections have to be coordinated with Section 01 33 00 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

### 3.6 CONTROL

CQC is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

#### 3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

- a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.
- b. Review of the Contract drawings.
- c. Check to assure that all materials and equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.
- [ e. Review Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.
- ] [e][f]. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.
- [f][g]. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- [g][h]. Review of the appropriate activity hazard analysis to assure safety requirements are met.
- [h][i]. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- [i][j]. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- [j][k]. Discussion of the initial control phase.
- [k][l]. The Government needs to be notified at least 48 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC

System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

### 3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

- a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing are in compliance with the contract.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government needs to be notified at least [\_\_\_\_\_] hours in advance of beginning the initial phase for definable feature of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with follow-up phases.
- g. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
- [ h. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

### 3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work. [Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.]

### 3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after

a substantial period of inactivity; or if other problems develop.

### 3.7 TESTS

#### 3.7.1 Testing Procedure

Not applicable.

#### 3.7.2 Testing Laboratories

Not applicable.

##### 3.7.2.1 Capability Check

Not applicable.

##### 3.7.2.2 Capability Recheck

Not applicable.

#### 3.7.3 Onsite Laboratory

Not applicable.

### 3.8 COMPLETION INSPECTION

#### 3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC System Manager near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

#### 3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

#### 3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative is required to be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and

major commands can also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the Contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the Contract clause titled "Inspection of Construction".

### 3.9 DOCUMENTATION

#### 3.9.1 Quality Control Activities

Maintain current records providing factual evidence that required quality control activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

- a. The name and area of responsibility of the Contractor/Subcontractor.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
- d. Test and control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.
- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals and deliverables reviewed, with Contract reference, by whom, and action taken.
- g. Offsite surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and specifications.

#### 3.9.2 Verification Statement

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Government daily within 48 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare

and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the Contractor Quality Control(CQC) System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

### 3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

### 3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

## SECTION 01 50 00

## TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS

08/09

## PART 1 GENERAL

## 1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-01 Preconstruction Submittals

Construction Site Plan; G[, [\_\_\_\_\_]]

## [1.2 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

## ]1.3 BACKFLOW PREVENTERS CERTIFICATE

Not applicable.

## [1.3.1 Backflow Tester Certificate

Not applicable.

## ]1.3.2 Backflow Prevention Training Certificate

Not applicable.

## [1.4 [TYPHOON][HURRICANE] CONDITION OF READINESS

Unless directed otherwise, comply with:

- a. Condition FOUR (Sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards.

- b. Condition THREE (Sustained winds of 50 knots or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.
- c. Condition TWO (Sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact Contracting Officer for weather and Condition of Readiness (COR) updates and completion of required actions.
- d. Condition ONE. (Sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite, and leave Government premises.

## ]PART 2 PRODUCTS

### 2.1 TEMPORARY SIGNAGE

#### 2.1.1 Bulletin Board

Not applicable.

#### 2.1.2 Project and Safety Signs

Not applicable.

### 2.2 TEMPORARY TRAFFIC CONTROL

#### 2.2.1 Haul Roads

Not applicable.

#### 2.2.2 Barricades

Not applicable

#### 2.2.3 Fencing

Provide temporary fencing along the artifacts undergoing preservation to control access by unauthorized people.

- a. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 48 inches high and maximum mesh size of 2 inches, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. Install fencing to be able to restrain a force of at least 250 pounds against it.

[ ]2.3 TEMPORARY WIRING

Not applicable.

2.4 BACKFLOW PREVENTERS

Not applicable.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking must not interfere with existing and established parking requirements of the [Roebling Museum](#).

3.2 TEMPORARY BULLETIN BOARD

Not applicable.

3.3 AVAILABILITY AND USE OF UTILITY SERVICES

3.3.1 Temporary Utilities

Not applicable.

3.3.2 Payment for Utility Services

Not applicable.

3.3.3 Meters and Temporary Connections

Not applicable.

3.3.4 Advance Deposit

Not applicable.

3.3.5 Final Meter Reading

Not applicable.

3.3.6 Sanitation

a. Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system. Any penalties and / or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow station regulations and procedures when discharging into the station sanitary sewer system. Maintain these conveniences at all times without nuisance. Include provisions for pest control and elimination of odors. [Roebling Museum](#) toilet facilities will not be available to Contractor's personnel.

## 3.3.7 Telephone

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## 3.3.8 Obstruction Lighting of Cranes

Provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer.

## 3.3.9 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials [daily][weekly][monthly] to minimize potential hazards.

## 3.4 TRAFFIC PROVISIONS

## 3.4.1 Maintenance of Traffic

- a. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

## 3.4.2 Protection of Traffic

Not applicable.

## 3.4.3 Rush Hour Restrictions

Not applicable.

## 3.4.4 Dust Control

Not applicable.

## 3.5 CONTRACTOR'S TEMPORARY FACILITIES

Contractor-owned or -leased trailers must be identified by Government assigned numbers.

## 3.5.1 Safety

Not applicable.

## 3.5.2 Administrative Field Offices

Not applicable.

## 3.5.3 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored [green][brown], so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Do not place or store Trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of

the construction site but within the installation boundaries. Trailers, equipment, or materials must not be open to public view with the exception of those items which are in support of ongoing work on any given day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

#### 3.5.4 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but will be within the installation boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor is responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

#### 3.5.5 Appearance of Trailers

- a. Trailers utilized by the Contractor for administrative or material storage purposes must present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on installation property.
- b. [Paint using suitable paint] and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

#### 3.5.6 Maintenance of Storage Area

- a. Keep fencing in a state of good repair and proper alignment. Grassed or unpaved areas, which are not established roadways, will be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways, should the Contractor elect to traverse them with construction equipment or other vehicles; gravel gradation will be at the Contractor's discretion. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers will be edged or trimmed neatly.

#### 3.5.7 New Building

Not applicable.

#### 3.5.8 Security Provisions

Provide adequate outside security lighting at the Contractor's temporary facilities. The Contractor will be responsible for the security of its own equipment; in addition, the Contractor will notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

#### 3.5.9 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical

openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

#### 3.5.9.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

### 3.6 GOVERNMENT FIELD OFFICE

#### 3.6.1 Resident Engineer's Office

Not applicable.

#### [3.6.2 Quality Control Manager Records and Field Office

Not applicable.

#### ]3.6.3 Trailer-Type Mobile Office

Not applicable.

### 3.7 PLANT COMMUNICATION

Not applicable.

Government personnel.

### 3.8 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work site.

### 3.9 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store any salvageable materials resulting from demolition activities within the fenced area described above or at the supplemental storage area. Neatly stack stored materials not in trailers, whether new or salvaged.

### 3.10 RESTORATION OF STORAGE AREA

Upon completion of the project remove all temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence that will become the property of the Contractor. Restore areas used by the Contractor for the storage of equipment or material, or other use to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to its original condition, including top soil and seeding as necessary.

-- End of Section --

## SECTION 01 57 19

## TEMPORARY ENVIRONMENTAL CONTROLS

11/15

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 64

Compliance Assurance Monitoring

49 CFR 171

General Information, Regulations, and Definitions

## 1.2 DEFINITIONS

## 1.2.1 Class I and II Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act. A list of Class I ODS can be found on the EPA website at the following weblink.

<http://www.epa.gov/ozone/science/ods/classone.html>.

Class II ODS is defined in Section 602(s) of The Clean Air Act. A list of Class II ODS can be found on the EPA website at the following weblink.

<http://www.epa.gov/ozone/science/ods/classtwo.html>.

## 1.2.2 Contractor Generated Hazardous Waste

Contractor generated hazardous waste is materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, waste solvents, excess pesticides, and contaminated pesticide equipment rinse water.

## 1.2.3 Electronics Waste

Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

## 1.2.4 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.

#### 1.2.5 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

#### 1.2.6 Hazardous Debris

As defined in paragraph SOLID WASTE, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) in accordance with 40 CFR 261. Hazardous debris also includes debris that exhibits a characteristic of hazardous waste in accordance with 40 CFR 261.

#### 1.2.7 Hazardous Materials

Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172.

Hazardous material is any material that: Is regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).

#### 1.2.8 Hazardous Waste

Hazardous Waste is any material that meets the definition of a solid waste and exhibit a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.

#### 1.2.9 Installation Pest Management Coordinator

Installation Pest Management Coordinator (IPMC) is the individual officially designated by the Installation Commander to oversee the Installation Pest Management Program and the Installation Pest Management Plan.

#### 1.2.10 Land Application

Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Comply with federal, state, and local laws and regulations.

#### 1.2.11 Municipal Separate Storm Sewer System (MS4) Permit

MS4 permits are those held by installations to obtain NPDES permit coverage for their stormwater discharges.

#### 1.2.12 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

#### 1.2.13 Oily Waste

Oily waste are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from that POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimus" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

#### 1.2.14 Pesticide

Pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

#### 1.2.15 Pesticide Treatment Plan

A plan for the prevention, monitoring, and control to eliminate pest infestation.

#### 1.2.16 Pests

Pests are arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

#### 1.2.17 Project Pesticide Coordinator

The Project Pesticide Coordinator (PPC) is an individual who resides at a Civil Works Project office and who is responsible overseeing of pesticide application on project grounds.

#### 1.2.18 Regulated Waste

Regulated waste are solid wastes that have specific additional federal, state, or local controls for handling, storage, or disposal.

#### 1.2.19 Sediment

Sediment is soil and other debris that have eroded and have been transported by runoff water or wind.

#### 1.2.20 Solid Waste

Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include:

##### 1.2.20.1 Debris

Debris is non-hazardous solid material generated during the construction, demolition, or renovation of a structure that exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (for example, cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials [may][may not] be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

##### 1.2.20.2 Green Waste

Green waste is the vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

##### 1.2.20.3 Material not regulated as solid waste

Material not regulated as solid waste is nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

##### 1.2.20.4 Non-Hazardous Waste

Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 263.

##### 1.2.20.5 Recyclables

Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, [wiring,] [insulated/non-insulated copper wire cable,] [wire rope,] and structural

components. It also includes commercial-grade refrigeration equipment with Freon removed, household appliances where the basic material content is metal, clean polyethylene terephthalate bottles, cooking oil, used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated [may][may not] be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

#### 1.2.20.6 Surplus Soil

Surplus soil is existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included and must be managed in accordance with paragraph HAZARDOUS MATERIAL MANAGEMENT.

#### 1.2.20.7 Scrap Metal

This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

#### 1.2.20.8 Wood

Wood is dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included. Treated wood includes, but is not limited to, lumber, utility poles, crossties, and other wood products with chemical treatment.

#### 1.2.21 Surface Discharge

Surface discharge means discharge of water into drainage ditches, storm sewers, creeks or "waters of the United States". Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

#### 1.2.22 Wastewater

Wastewater is the used water and solids from a community that flow to a treatment plant.

#### 1.2.22.1 Stormwater

Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.

#### 1.2.23 Waters of the United States

Waters of the United States means Federally jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

#### 1.2.24 Wetlands

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

#### 1.2.25 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found at [40 CFR 273](#).

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section [01 33 29](#) SUSTAINABILITY REPORTING. Submit the following in accordance with Section [01 33 00](#) SUBMITTAL PROCEDURES:

SD-01 Preconstruction SubmittalsRegulatory Notifications; G[, [\_\_\_\_]]  
Environmental Protection Plan; G[, [\_\_\_\_]]

Dirt and Dust Control Plan; G[, [\_\_\_\_]]

Employee Training Records; G[, [\_\_\_\_]]

Environmental Manager Qualifications; G[, [\_\_\_\_]]

#### SD-07 Certificates

Employee Training Records; G[, [\_\_\_\_]]

Certificate of Competency

#### SD-11 Closeout Submittals

Waste Determination Documentation; G[, [\_\_\_\_]]

Disposal Documentation for Hazardous and Regulated Waste; G[, [\_\_\_\_]]

Assembled Employee Training Records; G[, [\_\_\_\_]]

Hazardous Waste/Debris Management; G[, [\_\_\_\_]]

Regulatory Notifications; G[, [\_\_\_\_]]Sales Documentation; G[,  
[\_\_\_\_]]  
Contractor Certification

#### 1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Tests and procedures assessing whether construction operations comply with Applicable Environmental Laws may be required. Analytical work must be performed by qualified laboratories; and where required by law, the laboratories must be certified.

##### 1.4.1 Conformance with the Environmental Management System

Perform work under this contract consistent with the policy and objectives identified in the installation's Environmental Management System (EMS). Perform work in a manner that conforms to objectives and targets of the environmental programs and operational controls identified by the EMS. Support Government personnel when environmental compliance and EMS audits are conducted by escorting auditors at the Project site, answering questions, and providing proof of records being maintained. Provide monitoring and measurement information as necessary to address environmental performance relative to environmental, energy, and transportation management goals. In the event an EMS nonconformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, take corrective and preventative actions. In addition, employees must be aware of their roles and responsibilities under the installation EMS and of how these EMS roles and responsibilities affect work performed under the contract.

#### 1.5 SPECIAL ENVIRONMENTAL REQUIREMENTS

Not applicable.

#### 1.6 QUALITY ASSURANCE

##### 1.6.1 Preconstruction Survey and Protection of Features

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, perform a [Preconstruction Survey](#) of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record. Include in the report a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of

trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. The Contractor and the Contracting Officer will sign this survey report upon mutual agreement regarding its accuracy and completeness. Protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference that their preservation may cause to the work under the Contract.

#### 1.6.2 Regulatory Notifications

Not applicable.

#### 1.6.3 Environmental Brief

Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the installation; and types and quantities of wastes/wastewater that may be generated during the Contract. Discuss the results of the Preconstruction Survey at this time.

Prior to initiating any work on site, meet with the Contracting Officer and installation Environmental Office to discuss the proposed Environmental Protection Plan (EPP). Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

#### [1.6.4 Environmental Manager

Appoint in writing an Environmental Manager for the project site. The Environmental Manager is directly responsible for coordinating contractor compliance with federal, state, local, and installation requirements. The Environmental Manager implement the EPP; and ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements. This can be a collateral position; however, the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; and maintain the Environmental Records binder and required documentation. Submit [Environmental Manager Qualifications](#) to the Contracting Officer.

#### ]1.6.5 Employee Training Records

Prepare and maintain [Employee Training Records](#) throughout the term of the contract meeting applicable 40 CFR requirements. Provide Employee Training Records in the Environmental Records Binder. Submit these [Assembled Employee Training Records](#) to the Contracting Officer at the conclusion of the project, unless otherwise directed.

Train personnel to meet state requirements. Conduct environmental protection/pollution control meetings for personnel prior to commencing construction activities. Contact additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; recognition and protection of archaeological sites, artifacts, and waters of the United States.

#### [1.6.5.1 Pest Control Training

Not applicable.

#### ]1.6.6 Non-Compliance Notifications

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

### 1.7 ENVIRONMENTAL PROTECTION PLAN

The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Incorporate construction related objectives and targets from the installation's EMS into the EPP. Meet with the Contracting Officer or Contracting Officer Representative to discuss the EPP and develop a mutual understanding relative to the details for environmental protection including measures for protecting natural resources, required reports, and other measures to be taken. Submit the EPP within 15 days after notice to proceed. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications that change the project scope of work in a way that could have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite.

The EPP includes, but is not limited to, the following elements:

#### 1.7.1 General Overview and Purpose

##### 1.7.1.1 Descriptions

A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as management of materials used for artifact preservation including gasoline for generators, paints, and acids..

##### 1.7.1.2 Duties

The duties and level of authority assigned to the person(s) on the job site who oversee environmental compliance, such as who is responsible for adherence to the EPP, who is responsible for spill cleanup and training personnel on spill response procedures, who is responsible for manifesting hazardous waste to be removed from the site (if applicable), and who is responsible for training the Contractor's environmental protection personnel.

1.7.1.3 Procedures

A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site.

1.7.1.4 Communications

Communication and training procedures that will be used to convey environmental management requirements to Contractor employees and subcontractors.

1.7.1.5 Contact Information

Emergency contact information contact information (office phone number, cell phone number, and e-mail address).

1.7.2 General Site Information

1.7.2.1 Drawings

Drawings showing locations of proposed material storage areas, and sanitary facilities.

1.7.2.2 Work Area

Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and to contain materials on site.

1.7.2.3 Documentation

A letter signed by an officer of the firm appointing the Environmental Manager and stating that person is responsible for managing and implementing the Environmental Program as described in this contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.

1.7.3 Management of Natural Resources

c. Replacement of damaged landscape features

1.7.4 Protection of Historical and Archaeological Resources

All Existing Mill Yard Equipment to be preserved and the Gantry Crane..

1.7.5 Stormwater Management and Control

Not applicable.

1.7.6 Protection of the Environment from Waste Derived from Contractor Operations

Not applicable.

1.7.7 Prevention of Releases to the Environment

Procedures to prevent releases to the environment

Notifications in the event of a release to the environment

1.7.8 Regulatory Notification and Permits

Not applicable.

1.7.9 Clean Air Act Compliance

1.7.9.1 Haul Route

Not applicable.

1.7.9.2 Pollution Generating Equipment

Not applicable.

1.7.9.3 Stationary Internal Combustion Engines

Not applicable.

1.7.9.4 Refrigerants

Not applicable.

1.7.9.5 Air Pollution-engineering Processes

Identify planned air pollution-generating processes and management control measures (including, but not limited to, spray painting, abrasive blasting, demolition, material handling, fugitive dust, and fugitive emissions). Log hours of operations and track quantities of materials used.

1.7.9.6 Monitoring

Not applicable.

1.7.9.7 Compliant Materials

Provide the Government a list of and SDSs for all hazardous materials proposed for use on site. Materials must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements. The Government may alter or limit use of specific materials as needed to meet installation permit requirements for emissions.

1.8 LICENSES AND PERMITS

Not applicable.

]1.9 ENVIRONMENTAL RECORDS BINDER

Maintain on-site a separate three-ring Environmental Records Binder and submit at the completion of the project. Make separate parts within the

binder that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

[1.10 PESTICIDE DELIVERY, STORAGE, AND HANDLING

1.10.1 Delivery and Storage

Not applicable.

1.10.2 Handling Requirements

Not applicable.

]1.11 SOLID WASTE MANAGEMENT PERMIT

v

1.11.1 Solid Waste Management Report

Not applicable.

1.12 FACILITY HAZARDOUS WASTE GENERATOR STATUS

Not applicable.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified.

3.1.1 Flow Ways

Not applicable.

3.1.2 Vegetation

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor is responsible for any resultant damage.

Protect existing trees that are to remain to ensure they are not injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. Coordinate with the Contracting Officer and Installation Environmental Office to determine appropriate action for trees and other landscape features scarred or damaged by equipment operations.

3.1.3 Streams

Not applicable.

3.2 STORMWATER

Not applicable.

[3.2.1 Construction General Permit

Not applicable.

3.2.1.1 Stormwater Pollution Prevention Plan

Not applicable.

3.2.1.2 Stormwater Notice of Intent for Construction Activities

[3.2.1.3 Inspection Reports

Not applicable.

3.2.1.4 Stormwater Pollution Prevention Plan Compliance Notebook

Not applicable.

3.2.1.5 Stormwater Notice of Termination for Construction Activities

Not applicable.

]3.2.2 Erosion and Sediment Control Measures

Not applicable.

[3.2.2.1 Erosion Control

Not applicable.

]][3.2.2.2 Sediment Control Practices

Not applicable.

]3.2.3 Work Area Limits

Mark the areas that need not be disturbed under this Contract prior to commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

3.2.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Move or relocate the Contractor facilities only when approved by the Government. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant or work areas to protect adjacent areas.

3.2.5 Municipal Separate Storm Sewer System (MS4) Management

Not applicable.

3.3 SURFACE AND GROUNDWATER

3.3.1 Cofferdams, Diversions, and Dewatering

Not applicable.

3.3.2 Waters of the United States

Not applicable.

3.4 PROTECTION OF CULTURAL RESOURCES

3.4.1 Archaeological Resources

Existing archaeological resources within the work area are shown on the drawings. Protect these resources and be responsible for their preservation during the life of the Contract.

[3.4.2 Historical Resources

Not applicable.

]3.5 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with 40 CFR 64 and state air emission and performance laws and standards.

3.5.1 Preconstruction Air Permits

Not applicable.

3.5.2 Oil or Dual-fuel Boilers and Furnaces

Not applicable.

3.5.3 Burning

Not applicable.

3.5.4 Class I [and II ]ODS Prohibition

Not applicable.

3.5.5 Accidental Venting of Refrigerant

Not applicable.

3.5.6 EPA Certification Requirements

Not applicable.

3.5.7 Dust Control

Keep dust down at all times, including during nonworking periods.[ Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations.] Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.5.7.1 Particulates

Dust particles, aerosols and gaseous by-products from construction activities, and processing and preparation of materials (such as from

asphaltic batch plants) must be controlled at all times, including weekends, holidays, and hours when work is not in progress. Maintain work areas within or outside the project boundaries free from particulates that would exceed 40 CFR 50, state, and local air pollution standards or that would cause a hazard or a nuisance. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with state and local visibility regulations.

#### 3.5.7.2 Abrasive Blasting

The use of silica sand is prohibited in sandblasting.

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive agent, paint chips, and other debris.[ Perform work involving removal of hazardous material in accordance with 29 CFR 1910.]

#### 3.5.8 Odors

Control odors from construction activities. The odors must be in compliance with state regulations and local ordinances and may not constitute a health hazard.

### 3.6 WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the installation's Pollution Prevention/Hazardous Waste Minimization Plan for reference material when preparing this part of the EPP. If no written plan exists, obtain information by contacting the Contracting Officer. Describe the anticipated types of the hazardous materials to be used in the construction when requesting information.

#### 3.6.1 Salvage, Reuse and Recycle

Not applicable.

#### 3.6.2 Nonhazardous Solid Waste Diversion Report

Not applicable.

### 3.7 WASTE MANAGEMENT AND DISPOSAL

#### 3.7.1 Waste Determination Documentation

Not applicable.

##### [3.7.1.1 Sampling and Analysis of Waste

###### 3.7.1.1.1 Waste Sampling

Not applicable.

###### 3.7.1.1.2 Laboratory Analysis

Not applicable.

###### 3.7.1.1.3 Analysis Type

Not applicable.

]3.7.2 Solid Waste Management

3.7.2.1 Solid Waste Management Report

Not applicable.

3.7.2.2 Control and Management of Solid Wastes

Not applicable.

3.7.3 Control and Management of Hazardous Waste

Not applicable.

3.7.3.1 Hazardous Waste/Debris Management

Not applicable.

Not applicable.

3.7.3.2 Waste Storage/Satellite Accumulation/90 Day Storage Areas

Not applicable.

3.7.3.3 Hazardous Waste Disposal

[3.7.3.3.1 Responsibilities for Contractor's Disposal

Not applicable.

3.7.3.3.1.1 Services

Not applicable.

3.7.3.3.1.2 Samples

Not applicable.

3.7.3.3.1.3 Analysis

Not applicable.

3.7.3.3.1.4 Labeling

Not applicable.

][3.7.3.3.2 Contractor Disposal Turn-In Requirements

Not applicable.

]3.7.3.4 Universal Waste Management

3.7.3.5 Electronics End-of-Life Management

Not applicable.

## 3.7.3.6 Disposal Documentation for Hazardous and Regulated Waste

Not applicable.

## ]3.7.4 Releases/Spills of Oil and Hazardous Substances

## 3.7.4.1 Response and Notifications

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Installation Fire Department, the Installation Command Duty Officer, the Installation Environmental Office, the Contracting Officer[ and the state or local authority].

Submit verbal and written notifications as required by the federal ( 40 CFR 300.125 and 40 CFR 355), state, local regulations and instructions. Provide copies of the written notification and documentation that a verbal notification was made within 20 days. Spill response must be in accordance with 40 CFR 300 and applicable state and local regulations. Contain and clean up these spills without cost to the Government.

## 3.7.4.2 Clean Up

Clean up hazardous and non-hazardous waste spills. Reimburse the Government for costs incurred including sample analysis materials, clothing, equipment, and labor if the Government will initiate its own spill cleanup procedures, for Contractor- responsible spills, when: Spill cleanup procedures have not begun within one hour of spill discovery/occurrence; or, in the Government's judgment, spill cleanup is inadequate and the spill remains a threat to human health or the environment.

## 3.7.5 Mercury Materials

Not applicable.

## 3.7.6 Wastewater

## 3.7.6.1 Disposal of wastewater must be as specified below.

## 3.7.6.1.1 Treatment

Not applicable.

## 3.7.6.1.2 Surface Discharge

Not applicable.

## 3.7.6.1.3 Land Application

Not applicable.

## 3.8 HAZARDOUS MATERIAL MANAGEMENT

Not applicable.

### 3.9 PREVIOUSLY USED EQUIPMENT

Not applicable.

[3.10 CONTROL AND MANAGEMENT OF ASBESTOS-CONTAINING MATERIAL (ACM)

Not applicable.

] [3.11 CONTROL AND MANAGEMENT OF LEAD-BASED PAINT (LBP)

Not applicable.

] [3.12 CONTROL AND MANAGEMENT OF POLYCHLORINATED BIPHENYLS (PCBS)

Not applicable.

] [3.13 CONTROL AND MANAGEMENT OF LIGHTING BALLAST AND LAMPS CONTAINING PCBS

Not applicable.

] [3.14 MILITARY MUNITIONS

Not applicable.

] 3.15 PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING

Not applicable.

3.15.1 Used Oil Management

Not applicable.

3.15.2 Oil Storage Including Fuel Tanks

Not applicable.

3.16 INADVERTENT DISCOVERY OF PETROLEUM-CONTAMINATED SOIL OR HAZARDOUS WASTES

Not applicable.

[3.17 PEST MANAGEMENT

Not applicable.

3.17.1 Application

Not applicable.

3.17.2 Pesticide Treatment Plan

Not applicable.

] 3.18 CHLORDANE

Not applicable.

3.19 SOUND INTRUSION

Not applicable.

3.20 POST CONSTRUCTION CLEANUP

Not applicable.

-- End of Section --

## SECTION 01 78 00

## CLOSEOUT SUBMITTALS

08/11

## PART 1 GENERAL

## 1.1 DEFINITIONS

## 1.1.1 As-Built Drawings

As-built drawings are developed and maintained by the Contractor and depict actual conditions, including deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to Contractor submitted Requests for Information; direction from the Contracting Officer; designs which are the responsibility of the Contractor, and differing site conditions. Maintain the as-builts throughout construction as[ red-lined hard copies on site][ and][ or][ red-lined PDF files]. These files serve as the basis for the creation of the record drawings.

## 1.1.2 Record Drawings

The record drawings are the final compilation of actual conditions reflected in the as-built drawings.

## 1.2 SOURCE DRAWING FILES

Request the full set of electronic drawings, in the source format, for Record Drawing preparation, after award and at least 30 days prior to required use.

## 1.2.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction [drawings and ]data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CAD drawing files are not construction documents. Differences may exist between the CAD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CAD files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any

conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

See list of submittals in Section 01 11 00.

SD-08 Manufacturer's Instructions

Posted Instructions  
SD-11 Closeout Submittals

As-Built Record of Equipment and Materials  
Final Approved Shop Drawings

### 1.4 SPARE PARTS DATA

Not applicable.

### 1.5 QUALITY CONTROL

Not applicable.

### 1.6 WARRANTY MANAGEMENT

#### 1.6.1 Warranty Management Plan

Not applicable.1.6.2 Performance Bond

Not applicable.

#### 1.6.3 Pre-Warranty Conference

Not applicable.

#### 1.6.4 Contractor's Response to Construction Warranty Service Requirements

Not applicable.

#### 1.6.5 Warranty Tags

Not applicable.

Type of product/material	
--------------------------	--

Model number	
Serial number	
Contract number	
Warranty period from/to	
Inspector's signature	
Construction Contractor	
Address	
Telephone number	
Warranty contact	
Address	
Telephone number	
Warranty response time priority code	
WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.	

## PART 2 PRODUCTS

## 2.1 GOVERNMENT FURNISHED MATERIALS

Not applicable.

## 2.2 SYSTEM DESCRIPTION

Not applicable..

## 2.2.1 Additional Drawings

Not applicable.

## 2.2.1.1 Sheet Numbers and File Names

Not Applicable.

## 2.3 CERTIFICATION OF EPA DESIGNATED ITEMS

Not applicable.Submi

## PART 3 EXECUTION

## 3.1 AS-BUILT DRAWINGS

Not Applicable.

## 3.1.1 Markup Guidelines

Not applicable. 3.1.2 As-Built Drawings Content

Not Applicable. 3.2 RECORD DRAWING FILES

Not applicable.

## 3.2.1 Rename the CAD Drawing files

Not applicable.

## 3.3 RECORD DRAWINGS

Not Applicable.

## 3.3.1 Final Record Drawing Package

Not Applicable.

## 3.4 FINAL APPROVED SHOP DRAWINGS

Not Applicable.

## 3.5 CONSTRUCTION CONTRACT SPECIFICATIONS

Not applicable.

## 3.6 AS-BUILT RECORD OF EQUIPMENT AND MATERIALS

Not applicable.

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				
Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

## 3.7 OPERATION AND MAINTENANCE MANUALS

Not applicable.

## 3.8 CLEANUP

Not applicable.

## [3.8.1 Extraordinary Cleanup Requirements

Not applicable.

]3.9 REAL PROPERTY RECORD

Not applicable.

-- End of Section --

SECTION 02 82 33.13 20

REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD  
08/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)

AIHA Z88.6 (2006) Respiratory Protection - Respirator Use-Physical Qualifications for Personnel

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD 6780 (1995; Errata Aug 1996; Rev Ch. 7 - 1997) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and

Operators of Hazardous Waste Treatment,  
Storage, and Disposal Facilities

40 CFR 268

Land Disposal Restrictions

40 CFR 745

Lead-Based Paint Poisoning Prevention in  
Certain Residential Structures

49 CFR 172

Hazardous Materials Table, Special  
Provisions, Hazardous Materials  
Communications, Emergency Response  
Information, and Training Requirements

49 CFR 178

Specifications for Packagings

#### UNDERWRITERS LABORATORIES (UL)

UL 586

(2009; Reprint Sep 2014) Standard for  
High-Efficiency Particulate, Air Filter  
Units

### 1.2 DEFINITIONS

#### 1.2.1 Abatement

Not Applicable

#### 1.2.2 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period in a work environment.

#### 1.2.3 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries, which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel.

#### 1.2.4 Child Occupied Facility

Not Applicable

#### 1.2.5 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations. A Certified Industrial Hygienist (CIH) certified for comprehensive practice by the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals is the best choice.

#### 1.2.6 Contaminated Room

Not Applicable

#### 1.2.7 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a

contaminated clothing storage and disposal rooms, with a shower facility in between.

#### 1.2.8 Deleading

Activities conducted by a person who offers to eliminate lead-based paint or lead-based paint hazards or to plan such activities in commercial buildings, bridges or other structures.

#### 1.2.9 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.

#### 1.2.10 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron or larger size particles.

#### 1.2.11 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps.

#### 1.2.12 Lead-Based Paint (LBP)

Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

#### 1.2.13 Lead-Based Paint Activities

INot Applicable

#### 1.2.14 Lead-Based Paint Hazard (LBP Hazard)

Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

#### 1.2.15 Paint with Lead (PWL)

Any paint that contains lead as determined by the testing laboratory using a valid test method. The requirements of this section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

#### 1.2.16 Lead Control Area

A system of control methods to prevent the spread of lead dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

## 1.2.17 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a workday, the PEL shall be determined by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

## 1.2.18 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

## 1.2.19 Physical Boundary

Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area but inside the physical boundary."

## 1.2.20 Target Housing

Not Applicable

## 1.3 DESCRIPTION

## 1.3.1 Description of Work

Remove/control lead-based / paint with lead i located on historic artifacts.

## 1.3.2 Coordination with Other Work

The contractor shall coordinate with work being performed in adjacent areas. Coordination procedures shall be explained in the Removal/Control Plan and shall describe how the Contractor will prevent lead exposure to other contractors and/or Government personnel performing work unrelated to lead activities.

## 1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Vacuum Filters; G[, [\_\_\_\_\_]]

Respirators; G[, [\_\_\_\_]]

#### SD-06 Test Reports

Sampling Results; G[, [\_\_\_\_]]

Occupational and Environmental Assessment Data Report; G[, [\_\_\_\_]]

#### SD-07 Certificates

Qualifications of CP; G[, [\_\_\_\_]]

Testing Laboratory qualifications; G[, [\_\_\_\_]]

[ Occupant Notification; G[, [\_\_\_\_]]

][ Training Certification of workers and supervisors; G[, [\_\_\_\_]]]

[ Notification of the Commencement of [LBP] Hazard Abatement; G[, [\_\_\_\_]]

]

[ Third Party Consultant Qualifications; G[, [\_\_\_\_]]

] lead-based paint/paint with lead removal/control plan including CP approval (signature, date, and certification number); G[, [\_\_\_\_]]

Rental equipment notification; G[, [\_\_\_\_]]

Respiratory Protection Program; G[, [\_\_\_\_]]

Hazard Communication Program; G[, [\_\_\_\_]]

EPA approved hazardous waste treatment, storage, or disposal facility for lead disposal; G[, [\_\_\_\_]]

Lead Waste Management Plan; G[, [\_\_\_\_]]

Vacuum filters; G[, [\_\_\_\_]]

[ Clearance Certification; G[, [\_\_\_\_]]

#### ] SD-11 Closeout Submittals

Completed and Signed Hazardous Waste Manifest from Treatment or Disposal Facility; G[, [\_\_\_\_]]

Certification of Medical Examinations; G[, [\_\_\_\_]]

Employee Training Certification; G[, [\_\_\_\_]]

[ Waste Turn-In Documents or Weight Tickets for Non-Hazardous Wastes that are Disposed of at Sanitary or Construction and Demolition Landfills; G[, [\_\_\_\_]]

## ]1.5 QUALITY ASSURANCE

### 1.5.1 Qualifications

#### 1.5.1.1 Qualifications of CP

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph entitled "Competent Person (CP) Responsibilities." Provide previous experience of the CP. Submit proper documentation that the CP is trained [and licensed] [and certified] in accordance with Federal, State, and local laws.

#### 1.5.1.2 Training Certification

Submit a certificate for each employee and supervisor, signed and dated by the [authorized] training provider [meeting 40 CFR 745 (Subpart L) requirements], stating that the employee or supervisor has received the required lead training [and is certified to perform or supervise deleading or lead removal]. [Submit proof the work will be performed by a certified firm.]

#### 1.5.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air [and wipe] [and soil] sampling, testing, and reporting of airborne concentrations of lead. Use a laboratory accredited under the EPA National Lead Laboratory Accreditation Program (NLLAP) by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis shall be OSHA approved.

#### [1.5.1.4 Third Party Consultant Qualifications

Submit the name, address, and telephone number of the third party consultant selected to perform the wipe sampling for determining concentrations of lead in dust or soil sampling. Submit proper documentation that the consultant is trained and certified as an inspector technician or inspector/risk assessor by the USEPA authorized State (or local) certification and accreditation program.

## ]1.5.2 Requirements

### 1.5.2.1 Competent Person (CP) Responsibilities

- a. Verify training meets all federal, State, and local requirements.
- b. Review and approve lead-based paint/paint with lead removal/control plan for conformance to the applicable standards. Ensure work is performed in strict accordance with specifications at all times.
- c. Continuously inspect lead-based paint removal/control work for conformance with the approved plan.
- d. Perform air and wipe sampling.

- e. Control work to prevent hazardous exposure to human beings and to the environment at all times.
- f. Certify the conditions of the work as called for elsewhere in this specification.

#### 1.5.2.2 Lead-Based Paint/Paint with Lead Removal/Control Plan (LBP/PWL R/CP)

Submit a detailed job-specific plan of the work procedures to be used in the removal/control of LBP/PWL. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and paint debris disposal plan, air sampling plan, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training, sampling methodology, frequency, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multi-contractor worksites to inform affected employees and to clarify responsibilities to control exposures.

[ The Removal/Control Plan shall be developed by a certified planner/project designer.]

[ In occupied buildings, the Removal/Control Plan shall also include an occupant protection program that describes the measures that will be taken during the work to protect the building occupants.]

#### 1.5.2.3 Occupational and Environmental Assessment Data Report

If initial monitoring is necessary, submit occupational and environmental [sampling results](#) to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

[ In order to reduce the full implementation of [29 CFR 1926.62](#), the Contractor shall provide documentation. Submit a report that supports the determination to reduce full implementation of the requirements of [29 CFR 1926.62](#) and supporting the Lead Removal/Control Plan.]

- a. The initial monitoring shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per [29 CFR 1926.62](#). The data shall represent the worker's regular daily exposure to lead for stated work.
- b. Submit worker exposure data gathered during the task based trigger operations of [29 CFR 1926.62](#) with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting,

welding, cutting and torch burning where lead containing coatings are present.

- c. The initial assessment shall determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead compliance plan per 29 CFR 1926.62.

#### 1.5.2.4 Medical Examinations

Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1 day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, and 29 CFR 1926.103. Maintain complete and accurate medical records of employees for a period of at least 30 years or for the duration of employment plus 30 years, whichever is longer.

#### 1.5.2.5 Training

Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State and local regulations where appropriate.

#### 1.5.2.6 Respiratory Protection Program

- a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.
- b. Establish and implement a respiratory protection program as required by AIHA Z88.6, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

#### 1.5.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

#### 1.5.2.8 Lead Waste Management

The Lead Waste Management Plan shall comply with applicable requirements of federal, State, and local hazardous waste regulations and address:

- a. Identification and classification of hazardous wastes associated with the work.
- b. Estimated quantities of wastes to be generated and disposed of.
- c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location [and operator] and a 24-hour point of contact. Furnish two copies of proof of [EPA] [State] [and] [local] hazardous waste [permit applications] [permits] [manifests] [and] [EPA Identification numbers][Transporter Number].

- d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
- e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
- f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.
- g. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers.
- h. Unit cost for waste disposal according to this plan.

#### 1.5.2.9 Environmental, Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.62. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply. [The following [local] [and] [State] laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing of lead-contaminated materials apply:

- a. [\_\_\_\_\_]
- b. [\_\_\_\_\_]
- c. [\_\_\_\_\_]

[[Licensing] [and certification] in the State of [\_\_\_\_\_] is required.]

#### 1.5.3 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the lead waste management plan and the lead-based paint/paint with lead removal/control plan, including work procedures and precautions for the removal plan.

### 1.6 EQUIPMENT

#### 1.6.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust. Respirators shall comply with the requirements of 29 CFR 1926.62.

### 1.6.2 Special Protective Clothing

Furnish personnel who will be exposed to lead-contaminated dust with proper [disposable] [uncontaminated, reusable] protective whole body clothing, head covering, gloves, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

### 1.6.3 Rental Equipment Notification

If rental equipment is to be used during lead-based paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to the Contracting Officer.

### 1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

### 1.6.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the paint removal work within the lead controlled area. Personal protective equipment shall include disposable whole body covering, including appropriate foot, head, and hand protection. PPE shall remain the property of the Contractor. The Government will provide respiratory protection for the Contracting Officer.

## 1.7 PROJECT/SITE CONDITIONS

### 1.7.1 Protection of Existing Work to Remain

Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.

## PART 2 PRODUCTS

Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.

## PART 3 EXECUTION

### 3.1 PREPARATION

#### 3.1.1 Protection

##### 3.1.1.1 Notification

a. Notify the Contracting Officer 20 days prior to the start of any paint removal work.

c. Notification of the Commencement of [LBP] Hazard Abatement

[Submit a copy of the notification of the commencement of [LBP] hazard abatement to [\_\_\_\_\_] according to the procedures established by [\_\_\_\_].]

### 3.1.1.2 Boundary Requirements

- a. Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead will not escape outside the lead control area.
- b. Warning Signs - Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

### 3.1.1.3 Furnishings

Not Applicable

### 3.1.1.4 Heating, Ventilating and Air Conditioning (HVAC) Systems

Not Applicable

### 3.1.1.5 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

### 3.1.1.6 Eye Wash Station

Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

### 3.1.1.7 Mechanical Ventilation System

- a. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62.
- b. To the extent feasible, use local exhaust ventilation connected to HEPA filters or other collection systems, approved by the CP. Local exhaust ventilation systems shall be evaluated and maintained in accordance with 29 CFR 1926.62.
- c. Vent local exhaust outside the building only and away from building ventilation intakes.
- d. Use locally exhausted, power actuated, paint removal tools.

### 3.1.1.8 Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

### 3.2 ERECTION

#### 3.2.1 Lead Control Area Requirements

Establish a lead control area by situating critical barriers and physical boundaries around the area or structure where LBP/PWL removal/control operations will be performed.

[ Full containment - Contain removal operations by the use of [critical barriers] [and HEPA filtered exhaust] [a negative pressure enclosure system with decontamination facilities and with HEPA filtered exhaust if required by the CP]. For containment areas larger than 1,000 square feet install a minimum of two 18 inch square viewing ports. Locate ports to provide a view of the required work from the exterior of the enclosed contaminated area. Glaze ports with laminated safety glass.]

### 3.3 APPLICATION

#### 3.3.1 Work Procedures

Perform removal of lead-based paint in accordance with approved lead-based paint/paint with lead removal/control plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-based paint is removed in accordance with 29 CFR 1926.62. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), State, and local requirements.

#### 3.3.2 Lead-Based Paint Removal/Control/Deleading

[Manual or power sanding of interior and exterior surfaces is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead is prohibited] Provide methodology for LBP removal/control in work plan. Remove paint within the areas designated on the drawings in order to completely expose the substrate. Take whatever precautions necessary to minimize damage to the underlying substrate.

[ Avoid [flash rusting][deterioration] of the substrate. Provide surface preparations for painting in accord with Section 09 90 00 PAINTS AND COATINGS.]

Provide methodology for LBP/PWL [removal] [abatement/control] and processes to minimize contamination of work areas outside the control area with lead-contaminated dust or other lead-contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this LBP/PWL removal/control process in the LBP/PWL R/CP. [\_\_\_\_\_]

##### 3.3.2.1 Indoor Paint Removal

Not Applicable

##### 3.3.2.2 Outdoor Paint Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the LBP/CPR/CP. The worksite preparation (barriers or containments) shall be job dependent and presented in the LBP/PWL R/CP.

### 3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:

- a. Vacuum themselves off.
- b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.

[ c. Shower.]

[ c. Wash hands and face at the site, don appropriate disposable or uncontaminated reusable clothing; move to an appropriate facility; shower.]

- d. Change to clean clothes prior to leaving the physical boundary designated around the lead control area.

### 3.4 FIELD QUALITY CONTROL

#### 3.4.1 Tests

##### 3.4.1.1 Air and Wipe Sampling

Air sample for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling shall be directed or performed by the CP.

- a. The CP shall be on the job site directing the air and non-clearance wipe sampling and inspecting the lead-based paint removal/control work to ensure that the requirements of the contract have been satisfied during the entire lead-based paint removal operation.
- b. Collect personal air samples on employees who are expected to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
- c. Submit results of air samples, within 72 hours after the air samples are taken.
- [ d. Before any work begins, [a third party consultant shall] collect and analyze baseline wipe [and soil] samples in accordance with methods defined in federal, State, and local standards inside and outside of the physical boundary to assess the degree of dust contamination in the facility prior to lead-based paint removal/control.]
- [ e. Collect surface wipe samples at a location no greater than 10 feet outside the lead control area at a frequency of once per day while lead removal work is conducted. Surface wipe results shall meet criteria in paragraph "Clearance Certification."]

##### 3.4.1.2 Air Sampling During Paint Removal Work

Conduct area air sampling daily, on each shift in which lead-based paint removal operations are performed, in areas immediately adjacent to the lead control area. Sufficient area monitoring shall be conducted to ensure unprotected personnel are not exposed at or above 30 micrograms per cubic

meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, stop work, correct the condition(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Removal work shall resume only after the CP and the Contracting Officer give approval. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area.

#### 3.4.1.3 Sampling After Paint Removal/Control

After the visual inspection, [conduct soil sampling if bare soil is present during external removal/control operations and] collect wipe samples according to the HUD protocol contained in [HUD 6780](#) to determine the lead content of settled dust and dirt in micrograms per square meter foot of surface area [and [parts per million \(ppm\)](#) for soil].

#### [3.4.1.4 Testing of Removed Paint and Used Abrasive

Test removed paint and used abrasive in accordance with [40 CFR 261](#) for hazardous waste.

### ]3.5 CLEANING AND DISPOSAL

#### 3.5.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the CP. Reclean areas showing dust or residual paint chips or debris. After visible dust, chips and debris is removed, wet wipe and HEPA vacuum all surfaces in the work area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall then certify in writing that the area has been cleaned of lead contamination before restarting work.

##### 3.5.1.1 Clearance Certification

The CP shall certify in writing that air samples collected outside the lead control area during paint removal operations are less than 30 micrograms per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with [29 CFR 1926.62](#) and [40 CFR 745](#); and that there were no visible accumulations of material and dust containing lead left in the work site. Do not remove the lead control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification.

[ The third party consultant shall certify surface wipe sample results collected inside and outside the work area are [less than 40 micrograms per [square foot](#) on floors, less than 250 micrograms per [square foot](#) on interior window sills and less than 400 micrograms per [square foot](#) on window troughs] [not significantly greater than the initial surface loading determined prior to work].]

[ The third party consultant shall certify surface wipe sample results

collected inside and outside the work area are less than 200 micrograms per square foot on floors or horizontal surfaces.]

- [ Certify surface wipe samples are not significantly greater than the initial surface loading determined prior to work.]
- [ For exterior paint removal/control work, soil samples taken at the exterior of the work site shall be used to determine if soil lead levels had increased at a statistically significant level (significant at the 95 percent confidence limit) from the soil lead levels prior to the work. If soil lead levels do show a statistically significant increase or is above any applicable Federal or State standard for lead in soil, the soil shall be remediated back to the pre-work level.]
- [ Clear the lead control area in industrial facilities of all visible dust and debris.]
- [ For lead-based paint hazard abatement work, surface wipe and soil sampling shall be conducted and clearance determinations made according to the work practice standards presented in 40 CFR 745.227.]

### 3.5.2 Disposal

- a. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing that may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 262. Dispose of lead-contaminated waste material at an [EPA] [or] [State] approved hazardous waste treatment, storage, or disposal facility off Government property.
- b. Place waste materials in U.S. Department of Transportation (49 CFR 178) approved 55 gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. For hazardous waste, the collection drum requires marking/labeling in accordance with 40 CFR 262 during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.
- c. Handle, transport, and dispose lead or lead-contaminated material classified as hazardous waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.
- d. All material, whether hazardous or non-hazardous shall be disposed in accordance with laws and provisions and Federal, State, or local regulations. Ensure waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

#### 3.5.2.1 Disposal Documentation

Submit written evidence to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Contractor shall provide a certificate that

the waste was accepted by the disposal facility. [Provide [turn-in documents or weight tickets](#) for non-hazardous waste disposal.]

### 3.5.3 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials or non-hazardous waste delivered is returned and a copy is furnished to the Government.

-- End of Section --

SECTION 03 01 30.71

CONCRETE REHABILITATION

04/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C881/C881M

(2015) Standard Specification for  
Epoxy-Resin-Base Bonding Systems for  
Concrete

1.2 DEFINITIONS

1.2.1 Epoxy Resin Binder

A one or two-component epoxy bonding system in low and medium viscosities used by itself as a primer or for producing epoxy concrete or mortars when mixed with aggregate.

1.2.2 Epoxy Concrete

Not Applicable.

1.2.3 Epoxy Mortar

A combination of epoxy resin binder and fine aggregate used in the surface repair of non-structural cracks and filling of saw kerfs.

1.2.4 Non-Pressure Epoxy Grout

A combination of epoxy resin binder, a mineral filler and a thixotropic agent used in cementing dowels in place and the repair of non-structural cracks.

1.2.5 Pressure Grouting Epoxy

A low viscosity epoxy resin system pumped under pressure into structural cracks in walls or pavements.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-05 Design Data

Job Mix Formula

SD-06 Test Reports

Epoxy Resin Binder tests

Epoxy Grout tests

SD-07 Certificates

Epoxy Resin Binder

Epoxy Grout

SD-08 Manufacturer's Instructions

Epoxy Repair Material

Submit for mixing and applying.

1.4 QUALITY ASSURANCE

1.4.1 Design Data

1.4.1.1 Job Mix Formula

Submit, at least 15 days before work commences, a job-mix formula for each use of epoxy mortar. Test reports shall accompany the mix design. Identify the proposed source of the materials and state the proportions of aggregates and epoxy resin. When determining job mix, use samples of materials to be used on the job.

- a. Trial batches: Perform a minimum of three trial batchings in a certified testing laboratory. Try different aggregate-resin proportions to obtain satisfactory placing and finishing characteristics but keep the proportion by weight of aggregate to epoxy resin binder at least five to one. When mixing, add the fine aggregates first, and then the coarse aggregates. The final trial batch should be sufficiently wet so that some fines will "bleed" to the surface during finishing operations.
- b. Supporting criteria: Include in the submittal the following data for each trial batch:
  - (1) Proportions by weight
  - (2) Unit weights and specific gravities of constituents
  - (3) Batch weights
  - (4) Compressive strengths of 3 by 6 inch cylinders, made in accordance with ASTM C31/C31M, air cured for 7 days and tested in accordance with ASTM C39/C39M. Compressive strength shall be in accordance with the manufacturer's specifications.
  - (5) Curing time

#### 1.4.2 Test Reports

##### 1.4.2.1 Epoxy Resin Binder

Include the following:

- a. Viscosity
- b. Consistency
- c. Gel time
- d. Absorption
- e. Shrinkage
- f. Thermal compatibility

##### 1.4.2.2 Epoxy Resin Grout

Include the following:

- a. Epoxy number
- b. Consistency
- c. Compressive single shear strength
- d. Pot life

#### 1.5 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to site for damage, unload and store with a minimum of handling. Deliver epoxy resin components and aggregate materials in original sealed containers and store in dry covered areas at temperatures below 90 degrees F. Remove from job site unused mixed materials which have reached end of working or pot life.

#### 1.6 WEATHER LIMITATIONS

Halt work when weather conditions detrimentally affect the quality of patching or bonding concrete. Apply epoxy resin materials only when the contact surfaces are completely dry and if the atmospheric and surface temperature ranges are suitable for the specified epoxy material. Follow manufacturer's instructions for weather conditions and temperature ranges.

#### 1.7 TRAFFIC CONTROL

Not Applicable.

#### 1.8 EQUIPMENT

Use a container recommended by the epoxy manufacturer as the mixing vessel. Use a power drive (air or spark-proof) propeller type blade for mixing except that hand mixing may be used for small batches. Use equipment specified by epoxy manufacturer for field mixing of aggregates and epoxy resin.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Epoxy

##### 2.1.1.1 Epoxy Resin Binder for Concrete and Mortar

ASTM C881/C881M, Type III, Grade [1] [2], Class [B] [C] without mineral filler.

##### 2.1.1.2 Non-Pressure Epoxy Grout

ASTM C881/C881M Type IV, Grade [2] [3], Class [B] [C] with or without mineral filler.

##### 2.1.1.3 Crack Sealer for Pressure Grouting

ASTM C881/C881M, Type IV, Grade 1, Class [B] [C] without filler.

##### 2.1.1.4 Crack Surface Sealer for Pressure Grouting

ASTM C881/C881M, Type IV, Grade 3, Class [B] [C] with mineral filler.

#### 2.1.2 Aggregate

For material passing No. 200 sieve provide a non-plastic material composed of a minimum of 75 percent limestone dust, talc or silica inert filler. Provide dry aggregate.

For epoxy mortar: ASTM C144, No. 50 sieve.

## PART 3 EXECUTION

### 3.1 PREPARATION

#### 3.1.1 Epoxy Concrete

##### 3.1.1.1 Patch Areas

Remove loose concrete from the spalled areas indicated. Inspect the cavity for remaining defective concrete by tapping with a hammer or steel rod and listening for dull or hollow sounds. In areas where tapping does not produce a solid tone, remove additional concrete until testing produces a solid tone. Make the entire cavity at least one inch deep. Sawcut edges of cavity to avoid feather edging. Prepare surface of cavity by sandblasting, grinding, or water blasting. Remove dust, dirt, and loosely bonded material resulting from cleaning. Ensure cavity surfaces are dry.

##### 3.1.1.2 Spalls at Joints and Cracks

Not Applicable.

##### 3.1.1.3 Joints and Cracks

Clean and seal joints and cracks as specified in accordance per the manufacturer's specifications.

### 3.1.2 Epoxy Mortar for Cracks/Voids

Apply epoxy mortar to newly exposed loose and unsound materials. Prepare surfaces by sandblasting, scarifying or waterblasting. Remove dust, dirt, and loosely bonded material resulting from cleaning. Ensure surfaces are dry before application of epoxy mortar.

### 3.1.3 Epoxy Grout for Cracks/Gap Between Concrete and Base Plate

Apply grout to newly exposed concrete free of loose and unsound materials. Prepare surfaces by sandblasting, scarifying or waterblasting. Remove dust, dirt, and loosely bonded material resulting from cleaning. Ensure surfaces are dry before application of epoxy grout. **Formwork shall be used around the base plate to fill the gap between the base plate and concrete.**

## 3.2 MIXING MATERIALS

Make batches small enough to ensure placement before binder sets. Mix materials in accordance with manufacturer's recommendations.

## 3.3 PLACEMENT

### 3.3.1 Epoxy Concrete

**Not Applicable.**

### 3.3.2 Epoxy Mortar

Prime surfaces with epoxy resin binder. Scrub prime coat into surface with a stiff bristle brush. Make coating approximately 20 mils thick. Place epoxy mortar while primer is still tacky. Apply at a thickness recommended by the manufacturer. Work mortar into place and consolidate thoroughly so that contact surfaces are wetted by the mortar. Finish surface of mortar to the required texture. Do not feather edge epoxy mortar onto adjacent surfaces.

### 3.3.3 Non-Pressure Epoxy Grout

#### 3.3.3.1 Cementing Dowels

Immediately prior to placing the dowel, clean hole of dust and other deleterious material with a high pressure air hose. Fill hole halfway with grout. Insert dowel in hole by rotating it at least one complete turn while tapping it down. If necessary add more grout to fill hole.

#### 3.3.3.2 Epoxy Grout for Cracks

Apply epoxy grout at a thickness recommended by the manufacturer. Work grout into place and consolidate thoroughly so that contact surfaces are wetted by the grout. Finish surface of grout to the required texture. Do not feather edge epoxy grout onto adjacent surfaces.

### 3.3.4 Pressure Grouting of Cracks

Clean each crack of dust, dirt, loose concrete and unsound material. Insert a valve at both ends of each crack, at the junction of two cracks, and along the length of each crack at 16 to 20 inch intervals. Fill crack between valves with crack surface sealer. After crack surface sealer has hardened and cured, pump crack sealer into valve at one end of crack. For

vertical surfaces start at lowest valve and work upwards. As crack sealer appears at next valve, pinch closed pumping valve and move to next valve and commence pumping. Continue procedure until other end of crack is reached. Avoid delays in pumping operation. After crack sealer has hardened and cured grind valves off flush with concrete surface. Coat areas of valves with crack surface sealer and allow to harden and cure.

### 3.4 CURING

Cure epoxy materials in accordance with manufacturer's recommendations.

### 3.5 FIELD QUALITY CONTROL

#### 3.5.1 Sampling

As soon as epoxy resin and aggregate materials are available for sampling, obtain by random selection a sample of each batch. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use and quantity involved.

#### 3.5.2 Testing

At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification. [Test samples by an approved laboratory. If a sample fails to meet specification requirements after two tests, replace the batch represented by the samples tested and retest. Test aggregates in accordance with [ASTM C117](#) and [ASTM C136/C136M](#).]

#### 3.5.3 Inspection

Check each repaired area for cracks, spalls, popouts and loss of bond between repaired area and surrounding concrete. Check each repaired area for voids by tapping with a hammer or steel rod and listening for dull or hollow sounds. Immediately repair defects.

-- End of Section --

## SECTION 03 11 13.00 10

STRUCTURAL CAST-IN-PLACE CONCRETE FORMING  
05/14

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 301	(2016) Specifications for Structural Concrete
ACI 347	(2004; Errata 2008; Errata 2012) Guide to Formwork for Concrete

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-02 Shop Drawings

Formwork; G  
Form Removal Schedule; G

## SD-03 Product Data

Form Materials

## SD-04 Samples

Sample Panels; G  
Fiber Voids; G

## SD-05 Design Data

Calculations

## SD-06 Test Reports

Inspection

## SD-07 Certificates

## Fiber Voids

## 1.3 QUALITY ASSURANCE

Provide **Sample Panels** of sufficient size to contain joints and not less than **6 feet long and 4 feet wide**. The panels shall be of typical wall thickness and constructed containing the full allocation of reinforcing steel that will be used in the structure, with the forming system that duplicates in every detail the one that will be used in construction of the structure. Use the same concrete mixture proportion and materials, the same placement techniques and equipment, and the same finishing techniques and timing that are planned for the structure. Construction of a finish SF-3.0 will not be permitted until sample panels have been approved. Protect sample panels from construction operations in a manner to protect approved finish, and are not to be removed until all surface finish SF-3.0 concrete has been accepted. After shop drawings have been reviewed, submit sample panels for a surface finish SF-3.0 with applied architectural treatment; build panels on the project site where directed.

## 1.4 DELIVERY, STORAGE, AND HANDLING

Store fiber voids above ground level in a dry location. Keep fiber voids dry until installed and overlaid with concrete.

## PART 2 PRODUCTS

## 2.1 SYSTEM DESCRIPTION

The design, engineering, and construction of the formwork is the responsibility of the Contractor. Design formwork in accordance with methodology of **ACI 347 (the latest Edition)** for anticipated loads, lateral pressures, and stresses, and capable of withstanding the pressures resulting from placement and vibration of concrete. Comply with the tolerances specified in Section **03 30 00.00 10 01.00 10** CAST-IN-PLACE CONCRETE, paragraph CONSTRUCTION TOLERANCES. Design the formwork as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others. Monitor the adequacy of formwork design and construction prior to and during concrete placement as part of the Contractor's approved Quality Control Plan. Submit design analysis and **calculations** for form design and methodology used in the design. Submit at least **14** days either before fabrication on site or before delivery of prefabricated forms.

## 2.2 FORM MATERIALS

Submit manufacturer's data, including literature describing form materials, accessories, and form releasing agents.

## 2.2.1 Formwork

Comply with **ACI 301** Section 2. Provide for surfaces not exposed to public view a surface finish SF-1.0. Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with **ACI 301**. Submit **form removal schedule** indicating element and minimum length of time for form removal.

2.2.2 Retain-In-Place Metal Forms

Not Applicable.

2.2.3 Pan-Form Units

Not Applicable.

2.2.4 Fiber Voids

Not Applicable.

2.3 FIBER VOID RETAINERS

2.3.1 Polystyrene Rigid Insulation

Not Applicable.

2.3.2 Precast Concrete

Not Applicable.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Formwork

Comply with ACI 301 Section 2 with surface tolerances in accordance with ACI 117.

3.1.2 Fiber Voids

Not Applicable.

3.1.3 Fiber Void Retainers

Not Applicable.

3.2 INSPECTION

Inspect forms and embedded items in sufficient time prior to each concrete placement to certify to the Contracting Officer that they are ready to receive concrete. Report the results of each inspection in writing. Submit field inspection reports for concrete forms and embedded items.

-- End of Section --

SECTION 03 20 00.00 10

CONCRETE REINFORCING  
05/14

PART 1 GENERAL

1.1 UNIT PRICES

1.1.1 Deformed Steel Bars

1.1.1.1 Payment

Payment will be made for costs associated with furnishing and placing deformed steel bars for concrete reinforcement. Payment for steel in laps will be made as indicated or required. No payment will be made for additional steel in laps wherein the additional steel lap was made for the convenience of the Contractor.

1.1.1.2 Measurement

Deformed Steel Bars for Concrete Reinforcement will be measured for payment based upon the quantity of pounds in place. The measured lengths will be converted to weights for the size of bars listed by the use of the nominal weights per linear foot specified in ASTM A615/A615M.

1.1.1.3 Unit of Measure

Unit of measure: per pound.

1.1.2 Fabricated Deformed Steel Bar Mats

1.1.2.1 Payment

Not Applicable.

1.1.2.2 Measurement

Not Applicable.

1.1.2.3 Unit of Measure

Not Applicable.

1.1.3 Butt-Splices in Deformed Steel Bars

1.1.3.1 Payment

Not Applicable.

1.1.3.2 Measurement

Not Applicable.

1.1.3.3 Unit of Measure

Not Applicable.

#### 1.1.4 Steel Welded Wire Reinforcement

##### 1.1.4.1 Payment

Not Applicable.

##### 1.1.4.2 Measurement

Not Applicable.

##### 1.1.4.3 Unit of Measure

Not Applicable.

#### 1.1.5 Resplicing Bars

##### 1.1.5.1 Payment

Payment will be made for costs associated with resplicing bars selected for supplemental examinations and tests for those splices found to be acceptable. No payment will be made for costs associated with resplicing bars selected for supplemental examinations and tests for those splices found to be defective. No payment will be made for costs associated with the supplemental examinations and tests performed by the Government.

##### 1.1.5.2 Measurement

Resplicing Bars, selected for examinations and tests and found to be acceptable, will be measured for payment based upon 150 percent of the applicable contract unit price for pay item Butt-Splices in Deformed Steel Bars for Concrete Reinforcement. Resplicing Bars, selected for examinations and tests and found to be defective, will not be measured for payment.

##### 1.1.5.3 Unit of Measure

Unit of measure: each.

#### 1.1.6 Accessories

No payment will be made for costs associated with furnishing and placing accessories incidental to and included in the payment for other items of work.

## 1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 117 (2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary

ACI 318 (2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7 2017) Building

Code Requirements for Structural Concrete  
and Commentary

ACI SP-66 (2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM A370 (2016) Standard Test Methods and  
Definitions for Mechanical Testing of  
Steel Products

ASTM A615/A615M (2016) Standard Specification for Deformed  
and Plain Carbon-Steel Bars for Concrete  
Reinforcement

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP (2009; 28th Ed) Manual of Standard Practice

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation;  
submittals not having a "G" designation are for Contractor Quality Control  
approval. Submittals with an "S" are for inclusion in the Sustainability  
eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING.  
Submit the following in accordance with Section 01 33 00 SUBMITTAL  
PROCEDURES:

#### SD-01 Preconstruction Submittals

Butt-Splices; G

#### SD-02 Shop Drawings

Reinforcement; G

#### SD-03 Product Data

Mechanical Butt-Splices; G  
Reinforcing Steel; G

[ SD-04 Samples

Epoxy-Coated Bars

]

#### SD-06 Test Reports

Tests, Inspections, and Verifications; G

#### SD-07 Certificates

Reinforcing Steel  
Qualified Welders  
Qualification of Steel Bar Butt-Splicers

#### 1.4 QUALITY ASSURANCE

##### 1.4.1 Welding Qualifications

Not Applicable.

##### 1.4.2 Qualification of Steel Bar Butt-Splacers

Not Applicable.

##### 1.4.3 Qualification of Butt-Splicing Procedure

Not Applicable.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

Store reinforcement and accessories off the ground on platforms, skids, or other supports.

### PART 2 PRODUCTS

#### 2.1 DOWELS

Not Applicable.

#### 2.2 FABRICATED BAR MATS

Not Applicable.

#### 2.3 REINFORCING STEEL

Reinforcing steel of deformed bars conforming to ASTM A615/A615M, ASTM A706/A706M, or ASTM A1035/A1035M grades and sizes as indicated. Cold drawn wire used for spiral reinforcement must conform to ASTM A1064/A1064M.

Submit certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

#### 2.4 WELDED WIRE REINFORCING

Not Applicable.

#### 2.5 WIRE TIES

Use wire ties that are 16 gauge or heavier black annealed steel wire.

#### 2.6 SUPPORTS

Design bar supports for formed surfaces in accordance with CRSI 10MSP and fabricate of steel or precast concrete blocks. Provide precast concrete blocks with wire ties and not less than 4 inches square when supporting reinforcement on ground. Precast concrete block must have compressive strength equal to that of the surrounding concrete. Coat steel supports for coated or galvanized bars with electrically compatible material for a distance of at least 2 inches beyond the point of contact with the bar. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, use galvanized, plastic protected or stainless

steel supports within 1/2 inch of concrete surface. Concrete supports used in concrete exposed to view must have the same color and texture as the finish surface. For slabs on grade supports use precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

Provide bar supports complying with the requirements of ACI SP-66. Provide plastic-coated wire, stainless steel or precast concrete supports for bars in concrete with formed surfaces exposed to view or to be painted. Use wedge-shaped precast concrete supports, not larger than 3-1/2 by 3-1/2 inches, of thickness equal to that indicated for concrete cover and with an embedded hooked tie-wire for anchorage. Bar supports used in precast concrete with formed surfaces exposed to view must be the same quality, texture and color as the finish surfaces.

## 2.7 SYNTHETIC FIBER REINFORCEMENT

Not Applicable.

## 2.8 TESTS, INSPECTIONS, AND VERIFICATIONS

Perform material tests, specified and required by applicable standards, by an approved laboratory and certified to demonstrate that the materials are in conformance with the specifications. Perform and certify tests, inspections, and verifications and certify. Submit certified tests reports of reinforcement steel showing that the steel complies with the applicable specifications for each steel shipment and identified with specific lots prior to placement. Submit three copies of the heat analyses for each lot of steel furnished certifying that the steel conforms to the heat analyses.

### 2.8.1 Reinforcement Steel Tests

Perform mechanical testing of steel in accordance with ASTM A370 except as otherwise specified or required by the material specifications. Perform tension tests on full cross-section specimens using a gage length that spans the extremities of specimens with welds or sleeves included. From chemical analyses of steel heats report the percentages of carbon, phosphorous, manganese, sulphur and silicon present in the steel.

### 2.8.2 Non-Destructive Testing of Welds

Not Applicable.

## PART 3 EXECUTION

### 3.1 REINFORCEMENT

Fabricate and place reinforcement steel and accessories as specified, as indicated, and as shown on approved shop drawings. Fabrication and placement details of steel and accessories not specified or shown must be in accordance with ACI SP-66 and ACI 318. Cold bend reinforcement unless otherwise authorized. Bending may be accomplished in the field or at the mill. Do not bend bars after embedment in concrete. Place safety caps on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Face wire tie ends away from the forms. Submit detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Show support details including types, sizes and spacing.

### 3.1.1 Placement

Reinforcement must be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Place reinforcement in accordance with ACI 318 at locations indicated plus or minus one bar diameter. Do not continue reinforcement through expansion joints and place as indicated through construction or contraction joints. Cover with concrete coverage as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid interference with other reinforcement or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, requires approval before concrete is placed.

### 3.1.2 Placing Tolerances

Conform bar spacing and concrete cover to ACI 117.

### 3.1.3 Splicing

Conform splices of reinforcement to ACI 318 and make only as required or indicated. Bars may be spliced at alternate or additional locations at no additional cost to the Government subject to approval UNO. Splicing must be by lapping or by mechanical ; except that lap splices must not be used for bars larger than No. 11 unless otherwise indicated. Obtain EOR approval for replacement of the rebars on the drawings with larger size.

#### 3.1.3.1 Lap Splices

Place lapped bars in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Do not space lapped bars farther apart than 1/5 the required length of lap or 6 inches.

#### 3.1.3.2 Butt-Splices

Not Applicable.

##### 3.1.3.2.1 Welded Butt Splices

FNot Applicable.

##### 3.1.3.2.2 Mechanical Butt-Splices

Not Applicable.

## 3.2 WELDED-WIRE REINFORCEMENT PLACEMENT

Not Applicable.

## 3.3 DOWEL INSTALLATION

Not Applicable.

## 3.4 FIELD TESTS AND INSPECTIONS

### 3.4.1 Identification of Splices

Establish and maintain an approved method of identification of all field

splices.

### 3.4.2 Examining, Testing, and Correcting

Perform the following during the butt-splicing operations as specified and as directed:

#### 3.4.2.1 Visual Examination

Not Applicable.

#### 3.4.2.2 Tension Tests

Perform tensions tests to 90 percent of the minimum specified ultimate tensile strength of the spliced bars or to destruction on one test specimen made in the field for every 25 splices made. Test specimens must be made by the splicers engaged in the work, using the approved splicing procedure and the same size bars placed in the same relative position, and under the same conditions as those in the groups represented by the specimens. Furnish stress-strain curves for each butt-splice tested.

#### 3.4.2.3 Non-destructive Testing of Welded Splices

Not Applicable.

#### 3.4.2.4 Correction of Deficiencies

Do not embed splice in concrete until satisfactory results of visual examination and the required tests or examinations have been obtained. Remove all splices having visible defects or represented by test specimens which do not satisfy the tests or examinations. If any of the tension test specimens fail to meet the strength requirements or deformation limitations cut out two production splices from the same lot represented by the test specimens which failed and tension test. If both of the retests pass the strength requirements and deformation limitations all of the splices in the lot will be accepted. If one or both of the retests fail to meet the strength requirements or deformation limitations all of the splices in the lot will be rejected. Cut off the bars of rejected splices outside the splice zone. Finish the cut ends as specified, resplice and reinspect the joints.

#### 3.4.2.5 Supplemental Examination

The Contracting Officer may require additional or supplemental non-destructive testing and/or tension test of any completed splice. For costs of such examinations and tests see paragraph UNIT PRICES.

-- End of Section --

## SECTION 03 30 00.00 10

CAST-IN-PLACE CONCRETE  
05/14

## PART 1 GENERAL

## 1.1 UNIT PRICES

## 1.1.1 Measurement

Measurement of concrete for payment will be made on the basis of the actual volume within the pay lines of the structure as indicated on the contract drawings. Measurement for payment of concrete placed against the sides of any excavation without intervening forms will be made only within the pay lines of the structure as shown on the contract drawings. No deductions will be made for rounded or beveled edges, for space occupied by metal work, for conduits, for voids, or for embedded items which are less than 5 cubic feet in volume or 1 square foot in cross section.

## 1.1.2 Payment

Unless otherwise specified, payment for concrete will be made at the respective unit prices per cubic yard for the various items of the schedule, measured as specified above, which price includes the cost of all labor, materials, and the use of equipment and tools required to complete the concrete work, except for any reinforcement and embedded parts specified to be paid separately. Unit price payment will not be made for concrete placed in structures for which payment is made as a lump sum.

## 1.2 LUMP SUM CONTRACT

Under this type of contract, concrete items will be paid for by lump sum and will not be measured. The work covered by these items consists of furnishing all concrete materials, reinforcement, miscellaneous embedded materials, and equipment, and performing all labor for the forming, manufacture, transporting, placing, finishing, curing, and protection of concrete in these structures.

## 1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

- |           |                                                                                                          |
|-----------|----------------------------------------------------------------------------------------------------------|
| ACI 117   | (2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary |
| ACI 121R  | (2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001                      |
| ACI 211.1 | (1991; R 2009) Standard Practice for                                                                     |

	Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 214R	(2011) Evaluation of Strength Test Results of Concrete
ACI 301	(2016) Specifications for Structural Concrete
ACI 304.2R	(1996; R 2008) Placing Concrete by Pumping Methods
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305.1	(2014) Specification for Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 309R	(2005) Guide for Consolidation of Concrete
ACI 318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7 2017) Building Code Requirements for Structural Concrete and Commentary
ACI SP-15	(2011) Field Reference Manual: Standard Specifications for Structural Concrete ACI 301-05 with Selected ACI References

ASTM INTERNATIONAL (ASTM)

ASTM C1017/C1017M	(2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1064/C1064M	(2011) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1077	(2016) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C1107/C1107M	(2014a) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1240	(2014) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2014) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C136/C136M	(2014) Standard Test Method for Sieve

Analysis of Fine and Coarse Aggregates

ASTM C150/C150M	(2017) Standard Specification for Portland Cement
ASTM C1567	(2013) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2012) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C172/C172M	(2014a) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2016) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C192/C192M	(2016a) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C231/C231M	(2017) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C31/C31M	(2015a; E 2016) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C311/C311M	(2013) Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
ASTM C33/C33M	(2016) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2017) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C494/C494M	(2016) Standard Specification for Chemical Admixtures for Concrete
ASTM C618	(2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C685/C685M	(2014) Concrete Made by Volumetric

#### Batching and Continuous Mixing

ASTM C78/C78M (2016) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

ASTM C989/C989M (2017) Standard Specification for Slag Cement for Use in Concrete and Mortars

ASTM D5759 (2012) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses

ASTM D75/D75M (2014) Standard Practice for Sampling Aggregates

#### CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP (2009; 28th Ed) Manual of Standard Practice

#### NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44 (2016) Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

#### NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100 (2000; R 2006) Concrete Plant Standards

NRMCA QC 3 (2011) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

NRMCA TMMB 100 (2001; R 2007) Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards

#### U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104 (1980) Method of Calculation of the Fineness Modulus of Aggregate

### 1.4 Definitions

#### 1.4.1 Cementitious Material

As used herein, includes all portland cement, pozzolan, fly ash, ground granulated blast-furnace slag, and silica fume.

#### 1.4.2 Chemical Admixtures

Materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

#### 1.4.3 Complementary Cementing Materials (CCM)

Coal fly ash[, silica fume], granulated blast-furnace slag, natural or

calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the Portland cement that result in considerable improvement to sustainability, durability.

#### 1.4.4 Design Strength ( $f'_c$ )

The specified compressive strength of concrete at time(s) specified in this section to meet structural design criteria.

#### 1.4.5 Mass Concrete

Any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a section thickness of 3 feet or more regardless of temperature.

#### 1.4.6 Mixture Proportioning

The process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project.

#### 1.4.7 Mixture Proportions

The masses or volumes of individual ingredients used to make a unit measure (cubic yard) of concrete.

#### 1.4.8 Pozzolan

Siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

#### 1.4.9 Workability or Consistency

The ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

### 1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

Quality Control Plan; G[, [\_\_\_\_]]  
Laboratory Accreditation  
Sampling Plan; G[, [\_\_\_\_]]

## SD-03 Product Data

Recycled Content Products; (LEED)  
Cementitious Materials

Chemical Admixtures

## SD-04 Samples

Surface Retarder

## SD-05 Design Data

Mixture Proportions; G  
Lightweight Aggregate Concrete

## SD-06 Test Reports

Mixture Proportions; G  
Testing and Inspection for CQC; G  
Fly Ash  
Ground Granulated Blast-Furnace (GGBF) Slag  
Aggregates  
Air Content  
Slump  
Compressive Strength  
Water

## SD-07 Certificates

Contractor Quality Control personnel  
Ready-Mix Plant

## 1.6 QUALITY ASSURANCE

Submit qualifications for Contractor Quality Control personnel assigned to concrete construction as American Concrete Institute (ACI) Certified Workmen in one of the following grades or show written evidence of having completed similar qualification programs:

Concrete Field Testing Technician	Grade I
Concrete Laboratory Testing Technician	Grade I or II
Concrete Construction Inspector	Level II
Concrete Transportation Construction Inspector or Reinforced Concrete Special Inspector	Jointly certified by American Concrete Institute (ACI), Building Official and Code Administrators International (BOCA), International Code Council (ICC), and Southern Building Code Congress International (SBCCI)

Foreman or Lead Journeyman of the flatwork finishing crew	Similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation
-----------------------------------------------------------	----------------------------------------------------------------------------------------------------------

#### 1.6.1 Laboratory Accreditation

Provide laboratory and testing facilities. The laboratories performing the tests must be accredited in accordance with [ASTM C1077](#), including [ASTM C78/C78M](#) and [ASTM C1260](#). The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

##### 1.6.1.1 Aggregate Testing and Mix Proportioning

Perform aggregate testing and mixture proportioning studies in an accredited laboratory, under the direction of a [registered professional engineer in a U.S. state or territory who is competent in concrete materials. This person is required to sign all reports and designs.

##### 1.6.1.2 Acceptance Testing

Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by [ASTM C31/C31M](#).

##### 1.6.1.3 Contractor Quality Control

All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

#### 1.6.2 Quality Control Plan

Submit a concrete quality control program in accordance with the guidelines of [ACI 121R](#) and as specified herein. Identify the approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. Provide all quality control reports to the Quality Manager, Concrete Supplier and the Contracting Officer. Maintain a copy of [ACI SP-15](#) and [CRSI 10MSP](#) at the project site.

#### 1.6.3 Pre-installation Meeting

A pre-installation meeting with the Contracting Officer is required at least 10 days prior to start of construction on. Conduct the meeting with the Project Superintendent and active installation personnel present.

#### 1.6.4 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Include any of these materials to be used on the project in the mix design studies.

#### 1.6.5 Technical Service for Specialized Concrete

Not Applicable.

#### 1.6.6 Government Assurance Inspection and Testing

Day-to day inspection and testing is the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Contracting Officer can and will inspect construction as considered appropriate and will monitor operations of the CQC staff. Government inspection or testing will not relieve any CQC responsibilities.

##### 1.6.6.1 Materials

The Government will sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. Provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D75/D75M. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

##### 1.6.6.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C172/C172M and tested in accordance with these specifications, as considered necessary.

##### 1.6.6.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

##### 1.6.6.4 Inspection

Concrete operations may be tested and inspected by the Government as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Government for final acceptance.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301 and ACI 304R requirements and recommendations. Store cement and other cementitious materials in weathertight buildings, bins, or silos that exclude moisture and contaminants and keep each material completely separated. Arrange and use aggregate stockpiles in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Do not store aggregate directly on ground unless a sacrificial layer is left undisturbed. Store reinforcing bars and accessories above the ground on platforms, skids or other supports. Store other materials in a manner to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing cannot be used unless retested and proven to meet the specified requirements. Materials must be capable of being accurately identified after bundles or containers are opened.

## PART 2 PRODUCTS

In accordance with Section 01 33 29 SUSTAINABILITY REPORTING submit documentation indicating: distance between manufacturing facility and the project site, distance of raw material origin from the project site, percentage of post-industrial and post-consumer recycled content per unit of product and relative dollar value of recycled content products to total dollar value of products included in project. Provide Submittals as specified in the subject Section.

## 2.1 SYSTEM DESCRIPTION

Provide concrete composed of Portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as specified.

## 2.1.1 Proportioning Studies-Normal Weight Concrete

Trial design batches, mixture proportions studies, and testing requirements for various types of concrete specified are the responsibility of the Contractor. Base mixture proportions on compressive strength as determined by test specimens fabricated in accordance with ASTM C192/C192M and tested in accordance with ASTM C39/C39M. Obtain mix design approval from the Contracting Officer prior to concrete placement.

- a. Samples of all materials used in mixture proportioning studies must be representative of those proposed for use in the project and be accompanied by the manufacturer's or producer's test reports indicating compliance with these specifications.
- b. Make trial mixtures having proportions, consistencies, and air content suitable for the work based on methodology described in ACI 211.1, using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required on the project.
- c. The maximum water-cementitious material ratios allowed in subparagraph WATER-CEMENTITIOUS MATERIAL RATIO below will be the equivalent water-cementitious material ratio as determined by conversion from the weight ratio of water to cement plus pozzolan by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, include the weight of the silica fume and GGBF slag in the equations in ACI 211.1 for the term P, which is used to denote the weight of pozzolan. If pozzolan is used in the concrete mixture, the minimum pozzolan content is 15 percent by weight of the total cementitious material, and the maximum is 35 percent.
- d. Design laboratory trial mixtures for maximum permitted slump and air content. Make separate sets of trial mixture studies for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either may be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerator or a retarder may be used without separate trial mixture study. Separate trial mixture studies must also be made for concrete for any conveying or placing method proposed which requires special properties and for concrete to be placed in unusually difficult placing locations. For previously approved concrete mix designs used within the past twelve months, the previous mix design may be re-submitted without further trial batch testing if accompanied by material test data conducted

within the last six months.

- e. Report the temperature of concrete in each trial batch. For each water-cementitious material ratio, make at least three test cylinders for each test age, cure in accordance with [ASTM C192/C192M](#) and test at 7 and 28[56,][90] days in accordance with [ASTM C39/C39M](#). From these test results, plot a curve showing the relationship between water-cementitious material ratio and strength for each set of trial mix studies. In addition, plot a curve showing the relationship between 7 day and 28[56,][90] day strengths. Design each mixture to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding.
- f. Submit the results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of ingredients that will be used in the manufacture of each strength of concrete, at least 60 days prior to commencing concrete placing operations. Base aggregate weights on the saturated surface dry condition. Accompany the statement with test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. No substitutions may be made in the materials used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

#### 2.1.2 Proportioning Studies-Lightweight Aggregate Structural Conc

Not Applicable.

#### 2.1.3 Average Compressive Strength

The mixture proportions selected during mixture design studies must produce a required average compressive strength ( $f'_{cr}$ ) exceeding the specified compressive strength ( $f'_c$ ) by the amount indicated below, but may not exceed the specified strength at the same age by more than 20 percent. This required average compressive strength,  $f'_{cr}$ , will not be a required acceptance criteria during concrete production. However, whenever the daily average compressive strength at 28 days drops below  $f'_{cr}$  during concrete production, or daily average 7-day strength drops below a strength correlated with the 28-day  $f'_{cr}$ , adjust the mixture, as approved, to bring the daily average back up to  $f'_{cr}$ . During production, the required  $f'_{cr}$  must be adjusted, as appropriate, based on the standard deviation being attained on the job.

#### 2.1.4 Computations from Test Records

Where a concrete production facility has test records, establish a standard deviation in accordance with the applicable provisions of [ACI 214R](#). Test records from which a standard deviation is calculated must represent materials, quality control procedures, and conditions similar to those expected; must represent concrete produced to meet a specified strength or strengths ( $f'_c$ ) within 1000 psi of that specified for proposed work; and must consist of at least 30 consecutive tests. A strength test must be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28[56][90] days. Required average compressive strength  $f'_{cr}$  used as the basis for selection of concrete proportions must be in accordance with [ACI 318](#) Chapter 5.

## 2.1.1.5 Mix Design for Bonded Topping for Heavy Duty Floors

Not Applicable.

## 2.1.1.6 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices must be in accordance with [ACI 117](#). Take level and grade tolerance measurements of slabs as soon as possible after finishing; when forms or shoring are used, the measurements must be made prior to removal.

## 2.1.1.7 Floor Finish

Not Applicable.

## 2.1.1.8 Strength Requirements

Specified compressive strength ( $f'_c$ ) must be [4000 psi at 28 days](#).

Concrete made with high-early strength cement must have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength must be determined in accordance with [ASTM C39/C39M](#).

## 2.1.1.8.1 Evaluation of Concrete Compressive Strength

Fabricate [six] [eight] compressive strength specimens, [ [6 inch by 12 inch](#) ] [ [4 inch by 8 inch](#) ] cylinders, laboratory cure them in accordance with [ASTM C31/C31M](#) and test them in accordance with [ASTM C39/C39M](#). Test two cylinders at 7 days, two cylinders at 28 days, [two cylinders at 56 days][two cylinders at 90 days] and hold two cylinder in reserve. The strength of the concrete is considered satisfactory so long as the average of all sets of three consecutive test results do not exceed the specified compressive strength  $f'_c$  by 20 percent and no individual test result falls below the specified strength  $f'_c$  by more than [500 psi](#)), unless approved by the Contracting Officer. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests may be required when the strength of the concrete in the structure is considered potentially deficient.

## 2.1.1.8.2 Investigation of Low-Strength Compressive Test Results

When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than [500 psi](#) or if tests of field-cured cylinders indicate deficiencies in protection and curing, take steps to assure that the load-carrying capacity of the structure is not jeopardized. When the strength of concrete in place is considered potentially deficient, obtain cores and test in accordance with [ASTM C42/C42M](#). Take at least three representative cores from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the strength of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified

strength requirement and if no single core is less than 75 percent of the specified strength requirement. Non-destructive tests (tests other than test cylinders or cores) may not be used as a basis for acceptance or rejection. Perform the coring and repair the holes; cores will be tested by the Government.

#### 2.1.1.8.3 Load Tests

If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Contracting Officer in accordance with the requirements of [ACI 318](#). Correct concrete work evaluated by structural analysis or by results of a load test as being understrength in a manner satisfactory to the Contracting Officer. Perform all investigations, testing, load tests, and correction of deficiencies approved by the Contracting Officer, except that if all concrete is found to be in compliance with the drawings and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

#### 2.1.1.9 Water-Cementitious Material Ratio

Maximum water-cementitious material ratio (w/c) for normal weight concrete is [0.38 maximum](#).

#### 2.1.1.10 Air Entrainment

Air entrain normal weight concrete [is 6 % \(by volume\)](#).

Attain specified air content at point of placement into the forms within plus or minus 1.5 percent. Determine air content for normal weight concrete in accordance with [ASTM C231/C231M](#).

#### 2.1.1.11 Slump

Slump of the concrete, as delivered to the point of placement into the forms, must be within the following limits. Determine slump in accordance with [ASTM C143/C143M](#).

Structural Element	Slump <a href="#">inches</a>	
	Minimum	Maximum
	<a href="#">2</a>	
Footings, slabs	<a href="#">1</a>	<a href="#">3</a>
Any structural concrete approved for placement by pumping:		
At pump	<a href="#">2</a>	<a href="#">8</a>

At discharge of line	1	4
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[When use of a plasticizing admixture conforming to **ASTM C1017/C1017M** or when a Type F or G high range water reducing admixture conforming to **ASTM C494/C494M** is permitted to increase the slump of concrete, concrete must have a slump of **2 to 4 inches** before the admixture is added and a maximum slump of **8 inches** at the point of delivery after the admixture is added.

#### 2.1.12 Concrete Temperature

The temperature of the concrete as delivered must not exceed **90 degrees F**. When the ambient temperature during placing is **40 degrees F** or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered must be between **55 and 75 degrees F**.

#### 2.1.13 Size of Coarse Aggregate

Use the largest feasible nominal maximum size aggregate (NMSA), specified in PART 2 paragraph AGGREGATES, in each placement. However, do not exceed nominal maximum size of aggregate for any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

#### 2.1.14 Lightweight Aggregate Structural Concrete

Not Applicable.

### 2.2 CEMENTITIOUS MATERIALS

Cementitious Materials must be **Portland cement**, portland-pozzolan cement, [portland blast-furnace slag cement, or portland cement in combination with pozzolan or ground granulated blast furnace slag or silica fume conforming to appropriate specifications listed below. Restrict usage of cementitious materials in concrete that will have surfaces exposed in the completed structure so there is no change in color, source, or type of cementitious material.

#### 2.2.1 Portland Cement

**ASTM C150/C150M**, Type [I] [II] [III] [low alkali] [including false set requirements] with a maximum 10 percent amount of tricalcium aluminate, and a maximum cement-alkali content of 0.80 percent Na<sub>2</sub>O<sub>e</sub> (sodium oxide) equivalent. White **Portland cement** must meet the above requirements except that it may be Type I, Type II [or Type III] [low alkali]. [Use white Type III only in specific areas of the structure, when approved in writing.]

#### [2.2.2 High-Early-Strength Portland Cement

**ASTM C150/C150M**, Type III with tricalcium aluminate limited to [5] [8] percent, [low alkali]. Use Type III cement only in isolated instances and only when approved in writing.

### 12.2.3 Blended Cements

Conform blended cement to [ASTM C595/C595M](#) and [ASTM C1157/C1157M](#), Type IP or IS, including the optional requirement for mortar expansion [and sulfate soundness] and consist of a mixture of [ASTM C150/C150M](#) Type I, or Type II cement and a complementary cementing material. The slag added to the Type IS blend must be [ASTM C989/C989M](#) ground granulated blast-furnace slag. The pozzolan added to the Type IP blend must be [ASTM C618](#) Class F and must be interground with the cement clinker. Provide a manufacturer's statement that the amount of pozzolan in the finished cement will not vary more than plus or minus 5 mass percent of the finished cement from lot-to-lot or within a lot. Do not change the percentage and type of mineral admixture used in the blend from that submitted for the aggregate evaluation and mixture proportioning.

### 2.2.4 Fly Ash

Conform fly ash to [ASTM C618](#), Class F, except that the maximum allowable loss on ignition cannot exceed [3][6] percent. If pozzolan is used, it must never be less than [15][20][30][35][40][\_\_\_\_\_] percent by weight of the total cementitious material. Report the chemical analysis of the fly ash in accordance with [ASTM C311/C311M](#). Evaluate and classify fly ash in accordance with [ASTM D5759](#). Comply with EPA requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

### 2.2.5 Raw or Calcined Natural Pozzolan

Natural pozzolan must be raw or calcined and conform to [ASTM C618](#), Class N, including the optional requirements for uniformity and effectiveness in controlling Alkali-Silica reaction and must have an on ignition loss not exceeding 3 percent. Class N pozzolan for use in mitigating Alkali-Silica Reactivity must have a Calcium Oxide (CaO) content of less than 13 percent and total equivalent alkali content less than 3 percent.

### 2.2.6 Ultra Fine Fly Ash and Ultra Fine Pozzolan

Conform Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) [ASTM C618](#), Class F or N, and the following additional requirements:

- a. The strength activity index at 28 days of age is at least 95 percent of the control specimens.
- b. The average particle size does not exceed 6 microns.
- c. The sum of SiO<sub>2</sub> + Al<sub>2</sub>O<sub>3</sub> + Fe<sub>2</sub>O<sub>3</sub> is greater than 77 percent.

### 2.2.7 Ground Granulated Blast-Furnace (GGBF) Slag

[ASTM C989/C989M](#), Grade [100][120]. Slag content must be a minimum of [25][50][70] percent by weight of cementitious material. Submit test results in accordance with [ASTM C989/C989M](#) for GGBF slag. Submit test results performed within 6 months of submittal date..

### 2.2.8 Silica Fume

Conform silica fume to [ASTM C1240](#). Conform available alkalis to the optimal limit given in Table 2 of [ASTM C1240](#). Silica fume may be furnished as a dry, densified material or as a slurry. Proper mixing is

essential to accomplish proper distribution of the silica fume and avoid agglomerated silica fume which can react with the alkali in the cement resulting in premature and extensive concrete damage. In accordance with paragraph Technical Service for Specialized Concrete in PART 1, provide the services of a manufacturer's technical representative experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume. This representative must be present on the project prior to and during at least the first 4 days of concrete production and placement using silica fume. Use a High Range Water Reducer (HRWR) with silica fume.

## 2.3 AGGREGATES

[Test and evaluate fine and coarse aggregates for alkali-aggregate reactivity in accordance with [ASTM C1260](#). Evaluate the fine and coarse aggregates separately and in combination, which matches the proposed mix design proportioning. All results of the separate and combination testing must have a measured expansion less than 0.10 (0.08) percent at 16 days after casting. Should the test data indicate an expansion of 0.10 (0.08) percent or greater, reject the aggregate(s) or perform additional testing using [ASTM C1260](#) and [ASTM C1567](#). Perform the additional testing using [ASTM C1260](#) and [ASTM C1567](#) using the low alkali Portland cement in combination with ground granulated blast furnace (GGBF) slag, or Class F fly ash. Use GGBF slag in the range of 40 to 50 percent of the total cementitious material by mass. Use Class F fly ash in the range of 25 to 40 percent of the total cementitious material by mass.] [Provide fine and coarse aggregates conforming to the following.]

### 2.3.1 Fine Aggregate

Conform to the quality and gradation requirements of [ASTM C33/C33M](#).

### 2.3.2 Coarse Aggregate

Conform to [ASTM C33/C33M](#), Class 5S, size designation provided in Table 2 of [ASTM C33](#).

### 2.3.3 Lightweight Aggregate

Not Applicable.

### 2.3.4 Materials for Bonded Topping for Heavy Duty Floors

Not Applicable.

## 2.4 CHEMICAL ADMIXTURES

When required or permitted, conform to the appropriate specification listed. Furnish admixtures in liquid form and of suitable concentration for easy, accurate control of dispensing.

### 2.4.1 Air-Entraining Admixture

[ASTM C260/C260M](#) and must consistently entrain the air content in the specified ranges under field conditions.

#### 2.4.2 Accelerating Admixture

ASTM C494/C494M, Type C or E, except that calcium chloride or admixtures containing calcium chloride cannot be used.

#### 2.4.3 Water-Reducing or Retarding Admixture

ASTM C494/C494M, Type A, B, or D, except that the 6-month and 1-year compressive strength tests are waived.

#### 2.4.4 High-Range Water Reducer

ASTM C494/C494M, Type F or G, except that the 6-month and 1-year strength requirements are waived. Use the admixture only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

#### 2.4.5 Surface Retarder

ASTM C309. Submit sample of surface retarder material with manufacturer's instructions for application in conjunction with air-water cutting.

#### 2.4.6 Expanding Admixture

Aluminum powder type expanding admixture conforming to ASTM C937.

#### 2.4.7 Other Chemical Admixtures

Provide chemical admixtures for use in producing flowing concrete in compliance with ASTM C1017/C1017M, Type I or II. Use these admixtures only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

### 2.5 WATER

Provide water complying with the requirements of ASTM C1602/C1602M. Provide [potable] water for mixing, free of injurious amounts of oil, acid, salt, or alkali. Submit test report showing water complies with ASTM C1602/C1602M.

### 2.6 NONSHRINK GROUT

Provide nonshrink grout conforming to ASTM C1107/C1107M, and a commercial formulation suitable for the proposed application.

### 2.7 NONSLIP SURFACING MATERIAL

Not Applicable.

### 2.8 EMBEDDED ITEMS

Provide the size and type indicated or as needed for the application.

### 2.9 FLOOR HARDENER

Not Applicable.

## 2.10 PERIMETER INSULATION

Not Applicable.

## 2.11 JOINT MATERIALS

## 2.11.1 Joint Fillers, Sealers, and Waterstops

Not Applicable.

## 2.11.2 Contraction Joints in Slabs

Not Applicable.

## PART 3 EXECUTION

## 3.1 PREPARATION FOR PLACING

Before commencing concrete placement, perform the following: Clean surfaces to receive concrete, free from frost, ice, mud, and water. Place, clean, coat, and support forms in accordance with Section 03 11 13.00 10 STRUCTURAL CONCRETE FORMWORK. Place, clean, tie, and support reinforcing steel in accordance with Section 03 20 00.00 10 CONCRETE REINFORCEMENT. Transporting and conveying equipment is in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete is at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage is at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material is at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete as required in Section 03 39 00.00 10 CONCRETE CURING.

## 3.1.1 Foundations

## 3.1.1.1 Concrete on Earth Foundations

Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed is clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the foundation must be well drained, satisfactorily graded and uniformly compacted.

## 3.1.1.2 Preparation of Rock

Not Applicable.

## 3.1.1.3 Excavated Surfaces in Lieu of Forms

Concrete for [footings] [and] [walls] may be placed directly against the soil provided the earth or rock has been carefully trimmed, is uniform and stable, and meets the compaction requirements of Section 31 00 00 EARTHWORK. Place the concrete without becoming contaminated by loose material, and outlined within the specified tolerances.

## 3.1.2 Previously Placed Concrete

Not Applicable.

## 3.1.2.1 Air-Water Cutting

Not Applicable.

## 3.1.2.2 High-Pressure Water Jet

Not Applicable.

## 3.1.2.3 Wet Sandblasting

Not Applicable.

## 3.1.2.4 Waste Disposal

Dispose of waste water employed in cutting, washing, and rinsing of concrete surfaces in a manner that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal is subject to approval.

## 3.1.2.5 Preparation of Previously Placed Concrete

Abrade concrete surfaces to which other concrete is to be bonded in an approved manner that exposes sound aggregate uniformly without damaging the concrete. Remove laitance and loose particles. Thoroughly wash surfaces, leaving them moist but without free water when concrete is placed.

## 3.1.3 Vapor Retarder [and Barrier]

Not Applicable.

## 3.1.4 Perimeter Insulation

Not Applicable.

## 3.1.5 Embedded Items

Before placement of concrete, determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Conduit and other embedded items must be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete is permitted only when specifically authorized or directed. Temporarily fill voids in sleeves, inserts, and anchor slots with readily removable materials to prevent the entry of concrete into voids. Do not weld on embedded metals within 12 inches of the surface of the concrete. Do not tack weld on or to embedded items.

## 3.2 CONCRETE PRODUCTION

## 3.2.1 General Requirements

[Batch and mix concrete onsite or furnish from a ready-mixed concrete plant. Batch, mix, and transport ready-mixed concrete in accordance with ASTM C94/C94M, except as otherwise specified. Truck mixers, agitators, and nonagitating transporting units must comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities must be certified in accordance with NRMCA QC 3. Furnish approved batch tickets for each load of ready-mixed concrete. Conform site-mixed concrete to the following

subparagraphs.] [Batch and mix concrete onsite, or close to onsite, conforming to the following subparagraphs.]

### 3.2.2 Batching Plant

Locate the batching plant onsite in the general area indicated or offsite close to the project. The batching, mixing and placing system must have a capacity of at least 100 cubic yards per hour. Conform the batching plant to the requirements of NRMCA CPMB 100 and as specified; however, rating plates attached to batch plant equipment are not required.

### 3.2.3 Batching Equipment

Use semiautomatic or automatic batching controls as defined in NRMCA CPMB 100. Provide a semiautomatic batching system with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerance. Equip the batching system with accurate recorder or recorders that meet the requirements of NRMCA CPMB 100. Record the weight of water and admixtures if batched by weight. Provide separate bins or compartments for each size group of aggregate and type of cementitious material, to prevent intermingling at any time. Weigh aggregates either in separate weigh batchers with individual scales or, provided the smallest size is batched first, cumulatively in one weigh batcher on one scale. Do not weigh aggregate in the same batcher with cementitious material. If both portland cement and other cementitious material are used, they may be batched cumulatively, provided that the portland cement is batched first, [except always batch silica fume separately]. Water may be measured by weight or volume. Do not weigh or measure water cumulatively with another ingredient. Interlock filling and discharging valves for the water metering or batching system so that the discharge valve cannot be opened before the filling valve is fully closed. Piping for water and for admixtures must be free from leaks and valved to prevent backflow or siphoning. Furnish admixtures as a liquid of suitable concentration for easy control of dispensing. Provide an adjustable, accurate, mechanical device for measuring and dispensing each admixture. Interlock each admixture dispenser with the batching and discharging operation of the water so that each admixture is separately batched and individually discharged automatically in a manner to obtain uniform distribution throughout the water as it is added to the batch in the specified mixing period. [When use of truck mixers makes this requirement impractical, interlock the admixture dispensers with the sand batchers]. Different admixtures cannot be combined prior to introduction in water and are not allowed to intermingle until in contact with the cement. Provide admixture dispensers with devices to detect and indicate flow during dispensing or have a means for visual observation. Arrange the plant so as to facilitate the inspection of all operations at all times. Provide suitable facilities for obtaining representative samples of aggregates from each bin or compartment, and for sampling and calibrating the dispensing of cementitious material, water, and admixtures. Clearly mark filling ports for cementitious materials bins or silos with a permanent sign stating the contents.

### 3.2.4 Scales

Conform the weighing equipment to the applicable requirements of CPMB Concrete Plant Standard, and of NIST HB 44, except that the accuracy must be plus or minus 0.2 percent of scale capacity. Provide standard test weights and any other auxiliary equipment required for checking the

operating performance of each scale or other measuring devices. Perform the tests at the specified frequency in the presence of a Government inspector. Arrange the weighing equipment so that the plant operator can conveniently observe all dials or indicators.

### 3.2.5 Batching Tolerances

#### a. Tolerances with Weighing Equipment

MATERIAL	PERCENT OF REQUIRED WEIGHT
Cementitious materials	0 to plus 2
Aggregate	plus or minus 2
Water	plus or minus 1
Chemical admixture	0 to plus 6

#### b. Tolerances with Volumetric Equipment - For volumetric batching equipment used for water and admixtures, the following tolerances apply to the required volume of material being batched:

MATERIAL	PERCENT OF REQUIRED MATERIAL
Water	plus or minus 1
Chemical admixture	0 to plus 6

### 3.2.6 Moisture Control

Provide a plant capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the weights of the materials being batched.

### 3.2.7 Concrete Mixers

Use stationary mixers [or truck mixers] capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. Do not charge the mixers in excess of the capacity recommended by the manufacturer. Operate the mixers at the drum or mixing blade speed designated by the manufacturer. Maintain the mixers in satisfactory operating condition, and keep the mixer drums free of hardened concrete. Should any mixer at any time produce unsatisfactory results, promptly discontinue its use until it is repaired.

### 3.2.8 Stationary Mixers

Drum-type mixers of tilting, nontilting, horizontal-shaft, or vertical-shaft type, or pug mill type provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. Conform the mixing time and uniformity to all the requirements in [ASTM C94/C94M](#) applicable to central-mixed concrete.

### 3.2.9 Truck Mixers

Conform truck mixers, the mixing of concrete therein, and concrete uniformity to the requirements of [ASTM C94/C94M](#). A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Equip each truck with two counters from which it is possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. [Or, if approved, mark the number of revolutions on the batch tickets.] Do not add water at the placing site unless specifically approved; and in no case can it exceed the specified w/c. Inject any such water at the base of the mixer, not at the discharge end.

### 3.3 CONCRETE PRODUCTION, SMALL PROJECTS

Use batch-type equipment for producing concrete. Batch, mix and transport ready-mixed concrete in accordance with [ASTM C94/C94M](#), except as otherwise specified. Use truck mixers, agitators, and nonagitating transporting units in compliance with [NRMCA TMMB 100](#). Ready-mix plant equipment and facilities must be certified in accordance with [NRMCA QC 3](#). Furnish approved batch tickets for each load of ready-mixed concrete. Produce site-mixed concrete in accordance with [ACI 301](#), with plant conforming to [NRMCA CPMB 100](#). [In lieu of batch-type equipment, concrete may be produced by volumetric batching and continuous mixing, which conform to [ASTM C685/C685M](#).]

### 3.4 LIGHTWEIGHT AGGREGATE CONCRETE

Not Applicable

### 3.5 FIBER REINFORCED CONCRETE

Not Applicable.

### 3.6 TRANSPORTING CONCRETE TO PROJECT SITE

Transport concrete to the placing site in [truck mixers,] [agitators,] [nonagitating transporting equipment conforming to [NRMCA TMMB 100](#)] or by approved [pumping equipment] [conveyors]. Nonagitating equipment, other than pumps, cannot be used for transporting lightweight aggregate concrete.

### 3.7 PLACING CONCRETE

Discharge mixed concrete within 1.5 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds [85 degrees F](#), reduce the time to 45 minutes. Place concrete within 15 minutes after it has been discharged from the transporting unit. Handle concrete from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Provide adequate scaffolding, ramps and walkways so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities prevent proper consolidation, finishing and curing. Provide sufficient placing capacity so that concrete can be kept free of cold joints.

### 3.7.1 Depositing Concrete

Deposit concrete in accordance with [ACI 301](#) Section 5 and [ACI 304.2R](#).

### 3.7.2 Consolidation

Immediately after placing, consolidate each layer of concrete in accordance with [ACI 301](#) Section 5 and [ACI 309R](#).

### 3.7.3 Cold Weather Requirements

Perform cold weather concreting in accordance with [ACI 306.1](#). Use special protection measures, approved by the Contracting Officer, if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete must be not less than [40 degrees F](#). The temperature of the concrete when placed must be not less than [50 degrees F](#) nor more than [75 degrees F](#). Heat the mixing water or aggregates to regulate the concrete placing temperature. Materials entering the mixer must be free from ice, snow, or frozen lumps. Do not incorporate salt, chemicals or other materials in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to [ASTM C494/C494M](#), Type C or E may be used, provided it contains no calcium chloride. Do not use calcium chloride.

### 3.7.4 Hot Weather Requirements

When job-site conditions are present or anticipated that accelerate the rate of moisture loss or rate of cement hydration of freshly mixed concrete, including an ambient temperature of [80 degrees F](#) or higher, and an evaporation rate that exceeds [0.2 lb/ft<sup>2</sup>/h](#), conform concrete work to all requirements of [ACI 305.1](#).

### 3.7.5 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, be alert to the tendency for plastic shrinkage cracks to develop and institute measures to prevent this. Take particular care if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Conform with the requirement of [ACI 305.1](#). In addition further protect the concrete placement by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Fill plastic shrinkage cracks that occur by injection of epoxy resin as directed, after the concrete hardens. Never trowel over plastic shrinkage cracks or fill with slurry.

### 3.7.6 Placing Concrete in Congested Areas

Not Applicable.

### 3.7.7 Placing Flowable Concrete

If a plasticizing admixture conforming to [ASTM C1017/C1017M](#) is used or if a Type F or G high range water reducing admixture is permitted to increase the slump, the concrete must meet all requirements of paragraph SYSTEM DESCRIPTION. Use extreme care in conveying and placing the concrete to avoid segregation. No relaxation of requirements to accommodate flowable concrete will be permitted.

3.8 JOINTS

Not Applicable.

3.8.1 Construction Joints

Not Applicable.

3.8.2 Contraction Joints in Slabs on Grade

Not Applicable.

3.8.3 Expansion Joints

Not Applicable.

3.8.4 Waterstops

Not Applicable.

3.8.5 Dowels and Tie Bars

Not Applicable.

3.9 SPECIALTY FLOORS

3.9.1 Heavy Duty Floors

Not Applicable.

3.9.1.1 General

Not Applicable.

3.9.1.2 Preparation of Base Slab

Not Applicable.

3.9.2 Two-Course Floor Construction

Not Applicable.

3.10 FLOOR HARDENER

Not Applicable.

3.11 EXTERIOR SLAB AND RELATED ITEMS

3.11.1 Pavements

Not Applicable.

3.11.2 Sidewalks

Not Applicable.

### 3.11.3 Curbs and Gutters

Not Applicable.

### 3.11.4 Pits and Trenches

Not Applicable.

## 3.12 SETTING BASE PLATES AND BEARING PLATES

After being properly positioned, set column/post base plates, bearing plates for beams and similar structural members, and machinery and equipment base plates to the proper line and elevation with damp-pack bedding mortar, except where nonshrink grout is indicated. The thickness of the mortar or grout must be approximately 1/24 the width of the plate, but not less than 3/4 inch UNO on the drawings. Concrete and metal surfaces in contact with grout must be clean and free of oil and grease, and concrete surfaces in contact with grout damp and free of laitance when grout is placed. Use nonshrink grout for per the drawings.

### 3.12.1 Damp-Pack Bedding Mortar

Damp-pack bedding mortar consists of 1 part cement and 2-1/2 parts fine aggregate having water content such that a mass of mortar tightly squeezed in the hand will retain its shape but will crumble when disturbed. Pack the space between the top of the concrete and bottom of the bearing plate or base with the bedding mortar by tamping or ramming with a bar or rod until it is completely filled.

### 3.12.2 Nonshrink Grout

Ready-mixed material requiring only the addition of water. Water content must be the minimum that will provide a flowable mixture and completely fill the space to be grouted without segregation, bleeding, or reduction of strength.

#### 3.12.2.1 Mixing and Placing of Nonshrink Grout

Mix and place in conformance with the material manufacturer's instructions and as specified therein. Thoroughly dry-mix ingredients before adding water. After adding water, mix the batch for 3 minutes. Size batches to allow continuous placement of freshly mixed grout. Discard grout not used within 30 minutes after mixing. Fill the space between the top of the concrete or machinery-bearing surface and the plate solid with the grout. Use wood forms or other equally suitable material for completely retain the grout on all sides and on top, remove forms after the grout has set. Carefully work the placed grout by rodding or other means to eliminate voids; however, avoid overworking and breakdown of the initial set. Do not subject grout to retempering or to vibration from any source. Where clearances are unusually small, place under pressure with a grout pump. Maintain the temperature of the grout, and of surfaces receiving the grout, at 65 to 85 degrees F until after setting.

#### 3.12.2.2 Treatment of Exposed Surfaces

For metal-oxidizing nonshrink grout, cut back exposed surfaces 1 inch and immediately cover with a parge coat of mortar consisting of 1 part portland cement and 2-1/2 parts fine aggregate by weight, with sufficient water to make a plastic mixture. Smooth finish the parge coat. For other

mortars or grouts, exposed surfaces must have a smooth-dense finish and be left untreated. Cure in compliance with Section 03 39 00.00 10 CONCRETE CURING.

### 3.13 TESTING AND INSPECTION FOR CQC

Perform the inspection and tests described below and, based upon the results of these inspections and tests, take the action required. Submit certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

- a. When, in the opinion of the Contracting Officer, the concreting operation is out of control, cease concrete placement and correct the operation.
- b. The laboratory performing the tests must be onsite and conform with ASTM C1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer, at transfer points, or at the project site.
- c. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per [\_\_\_\_\_] thereafter for conformance with ASTM C1077.

#### 3.13.1 Grading and Corrective Action

##### 3.13.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there must be one sieve analysis and fineness modulus determination in accordance with ASTM C136/C136M and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. Select the location at which samples are taken as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, immediately resample and retest the fine aggregate. If there is another failure on any sieve, immediately report the failure to the Contracting Officer, stop concreting, and take immediate steps to correct the grading.

##### 3.13.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there must be a sieve analysis in accordance with ASTM C136/C136M for each size of coarse aggregate. Select the location at which samples are taken as the most advantageous for control. However, the Contractor is responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations must show the results of the current test as well as the average results of the five most recent tests including the current test. Limits may be adopted for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, immediately resample and retest the coarse aggregate. If the second sample fails on any sieve, report that failure to the Contracting Officer. Where two consecutive averages of 5 tests are outside

specification limits, the operation is to be considered out of control and must be reported to the Contracting Officer. Stop concreting and take immediate steps to correct the grading.

### 3.13.2 Quality of Aggregates

Thirty days prior to the start of concrete placement, perform all tests for aggregate quality required by [ASTM C33/C33M](#). In addition, after the start of concrete placement, perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Take samples for testing after the start of concrete placement immediately prior to entering the concrete mixer.

### 3.13.3 Scales, Batching and Recording

Check the accuracy of the scales by test weights prior to start of concrete operations and at least once every three months. Also conduct such tests as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week check the accuracy of each batching and recording device during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, test and ensure that the devices for dispensing admixtures are operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, do not operate the plant until necessary adjustments or repairs have been made. Immediately correct discrepancies in recording accuracies.

### 3.13.4 Batch-Plant Control

Continuously control the measurement of concrete materials, including cementitious materials, each size of aggregate, water, and admixtures. Adjust the aggregate weights and amount of added water as necessary to compensate for free moisture in the aggregates. Adjust the amount of air-entraining agent to control air content within specified limits. Prepare a report indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic [yard](#) amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic [yard](#) for each class of concrete batched during each day's plant operation.

### 3.13.5 Concrete Mixture

#### 3.13.5.1 [Air Content](#) Testing

Perform air content tests when test specimens are fabricated. In addition, make at least two tests for air content on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Perform additional tests when excessive variation in workability is reported by the placing foreman or Government inspector. Conduct tests in accordance with [ASTM C231/C231M](#) for normal weight concrete and [ASTM C173/C173M](#) for lightweight concrete. [Plot test results on control charts. Submit the control charts weekly and make them readily available to the Government. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, perform a second test immediately. Average the results of the two tests and use this average as the air content of the batch to plot on both

the air content and the control chart for range, and for determining need for any remedial action. Plot the result of each test, or average as noted in the previous sentence, on a separate control chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph AIR ENTRAINMENT. Set an upper warning limit and a lower warning limit line 1.0 percentage point above and below the average line, respectively. Set an upper action limit and a lower action limit line 1.5 percentage points above and below the average line, respectively. Plot the range between each two consecutive tests on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the materials or transportation methods cause air content loss between the mixer and the placement, take correlation samples at the placement site as required by the Contracting Officer, and the control the air content at the mixer as directed.]

#### [3.13.5.2 Air Content Corrective Action

Whenever points on the control chart for percent air reach either warning limit, immediately make an adjustment in the amount of air-entraining admixture batched. As soon as practical after each adjustment, make another test to verify the result of the adjustment. Whenever a point on the secondary control chart for range reaches the warning limit, recalibrate the admixture dispenser to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content is considered out of control and the concreting operation immediately halted until the air content is under control. Make additional air content tests when concreting is restarted.

#### ]3.13.5.3 Slump Testing

In addition to slump tests which are made when test specimens are fabricated during concrete placement/discharge, make at least four slump tests on randomly selected batches in accordance with ASTM C143/C143M for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, make additional tests when excessive variation in workability is reported by the placing foreman or Government inspector. [Plot test results on control charts. Submit the control charts and make them readily available to the Government. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, immediately perform a second test. Average the results of the two tests and use this average as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Set limits on separate control charts for slump for each type of mixture. Set the upper warning limit at 1/2 inch below the maximum allowable slump specified in paragraph SLUMP in PART 1 for each type of concrete and, set an upper action limit line and lower action limit line at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. Plot the range between each consecutive slump test for each type of mixture on a single control chart for range on which an upper action limit is set at 2 inches. Take samples for slump at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the materials or transportation methods cause slump loss between the mixer and the

placement, take correlation samples at the placement site as required by the Contracting Officer, and the slump at the mixer controlled as directed.]

#### [3.13.5.4 Slump Corrective Action

Whenever points on the control charts for slump reach the upper warning limit, make an adjustment immediately in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, deliver no further concrete to the placing site until proper adjustments have been made. Immediately after each adjustment, make another test to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, halt the concreting operation immediately, and take appropriate steps to bring the slump under control. Make additional slump tests as directed.

#### ]3.13.5.5 Temperature

Measure the temperature of the concrete when compressive strength specimens are fabricated in accordance with [ASTM C1064/C1064M](#). Report the temperature along with the compressive strength data.

#### 3.13.5.6 Strength Specimens

Perform on at least one set of test specimens, for [compressive strength](#) as appropriate, on each different concrete mixture placed during the day for each [500 cubic yards](#) or portion thereof of that concrete mixture placed each day. Perform on additional sets of test specimens, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. Develop a truly random (not haphazard) [sampling plan](#) for approval by the Contracting Officer prior to the start of construction. Show in the plan that sampling is done in a completely random and unbiased manner.

- a. A set of test specimens for concrete with a 28-day specified strength in accordance with paragraph STRENGTH REQUIREMENTS in PART 2 consists of five specimens, two to be tested at 7 days, two at 28 days, and one cylinder held in reserve.[ A set of test specimens for concrete with a [56-day] [90-day] strength in accordance with the same paragraph consists of eight specimens, two tested at 7 days, two at 28 days, two at [56] [90] days, and two held in reserve.]
- b. A strength test is the average of the strengths of at least two [6 inch by 12 inch cylinders](#) or at least three [4 inch by 8 inch](#) cylinders made for the same sample of concrete.
- c. Mold and cure test specimens in accordance with [ASTM C31/C31M](#), and test in accordance with [ASTM C39/C39M](#) for test cylinders. Immediately report results of all strength tests to the Contracting Officer.
- d. Maintain quality control charts for individual strength "tests", ("test" as defined in paragraph STRENGTH REQUIREMENTS) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. Provide charts similar to those

found in ACI 214R.

#### 3.13.6 Inspection Before Placing

Inspect foundations, construction joints, forms, and embedded items in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. Report the results of each inspection in writing.

#### 3.13.7 Placing

The placing foreman must supervise placing operations, determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Contracting Officer, and be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman must not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Do not continue placing if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, take immediate steps to improve temperature controls.

#### 3.13.8 Cold-Weather Protection

At least once each shift and once per day on non-work days, inspect all areas subject to cold-weather protection. Note any deficiencies, correct, and report.

#### [3.13.9 Mixer Uniformity

##### 3.13.9.1 Stationary Mixers

Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the shortest time interval, determine uniformity of concrete mixing in accordance with ASTM C94/C94M.

##### 3.13.9.2 Truck Mixers

Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, determine uniformity of concrete mixing in accordance with ASTM C94/C94M. Select the truck mixers randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

##### 3.13.9.3 Mixer Uniformity Corrective Action

When a mixer fails to meet mixer uniformity requirements, either increase the mixing time, change the batching sequence, reduce the batch size, or adjust the mixer until compliance is achieved.

#### ]3.13.10 Reports

Report all results of tests or inspections conducted, informally as they are completed and in writing daily. Prepare a weekly report for the updating of control charts covering the entire period from the start of

the construction season through the current week. During periods of cold-weather protection, prepare daily reports of pertinent temperatures. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Confirm such reports of failures and the action taken in writing in the routine reports. The Contracting Officer has the right to examine all contractor quality control records.

### 3.14 REPAIR, REHABILITATION AND REMOVAL

Before the Government accepts the structure and final payment is made, inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. Submit a report documenting these defects, which includes recommendations for repair, removal and/or remediation to the Contracting Officer for approval before any corrective work is accomplished.

#### [3.14.1 Crack Repair

Prior to final acceptance, document and repair all cracks in excess of 0.02 inches wide. Submit the proposed method and materials to repair the cracks to the Contracting Officer for approval. Address the amount of movement expected in the crack due to temperature changes and loading.

#### ]3.14.2 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Diamond grind concrete surfaces with weak surfaces less than 1/4 inch thick to remove the weak surface. Remove and replace surfaces containing weak surfaces greater than 1/4 inch thick, or mitigate in a manner acceptable to the Contracting Officer.

#### 3.14.3 Failure of Quality Assurance Test Results

Do not proceed with proposed mitigation efforts to restore the service life until approved by the Contracting Officer.

-- End of Section --

## SECTION 03 39 00.00 10

CONCRETE CURING  
05/14

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 301 (2016) Specifications for Structural Concrete

ACI 308.1 (2011) Specification for Curing Concrete

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Curing Materials

SD-06 Test Reports

Testing and Inspection for CQC

SD-08 Manufacturer's Instructions

Curing Compound

## 1.3 DELIVERY, STORAGE, AND HANDLING

Store materials in such a manner as to avoid contamination and deterioration. Materials must be capable of being accurately identified after bundles or containers are opened.

## PART 2 PRODUCTS

## 2.1 CURING MATERIALS

Provide curing materials in accordance with ACI 301 Sections 5 and ACI 308.1 Section 2. Submit product data and manufacturer's instructions for concrete curing compound.

## 2.2 WATER

Provide water for curing that is fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of [ASTM C1602/C1602M](#).

## PART 3 EXECUTION

### 3.1 CURING AND PROTECTION

Cure and protect concrete in accordance with [ACI 301](#) Section 5.

### 3.2 TESTING AND INSPECTION FOR CQC

Perform the inspection and tests described below and, based upon the results of these inspections and tests, take the action required. Submit certified copies of laboratory test reports, including curing compound proposed for use on this project.

#### 3.2.1 Moist Curing Inspections

At least once each shift, and not less than twice per day on both work and non-work days, inspect all areas subject to moist curing. Note and record the surface moisture condition.

#### 3.2.2 Moist Curing Corrective Action

When a daily inspection report lists an area of inadequate curing, take immediate corrective action, and extend the required curing period for those areas by 1 day.

#### 3.2.3 Membrane Curing Inspection

Apply no curing compound until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, estimate the quantity of compound used by measurement of the container and the area of concrete surface covered, compute the rate of coverage in [square feet/gallon](#), and note whether or not coverage is uniform.

#### 3.2.4 Membrane Curing Corrective Action

When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, spray the entire surface again.

#### 3.2.5 Sheet Curing Inspection

At least once each shift and once per day on non-work days, inspect all areas being cured using impervious sheets. Note and record the condition of the covering and the tightness of the laps and tapes.

#### 3.2.6 Sheet Curing Corrective Action

When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, promptly repair the tears and holes or replace the sheets, close the joints, and extend the required curing period for those areas by 1 day.

-- End of Section --



## SECTION 05 05 23.16

STRUCTURAL WELDING  
05/14

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

**AISC 360** (2016) Specification for Structural Steel Buildings

## AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

**ANSI/ASNT CP-189** (2016) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel (ANSI/ASNT CP-105-2006)

## AMERICAN WELDING SOCIETY (AWS)

**AWS A2.4** (2012) Standard Symbols for Welding, Brazing and Nondestructive Examination

**AWS D1.1/D1.1M** (2015; Errata 1 2015; Errata 2 2016) Structural Welding Code - Steel

**AWS Z49.1** (2012) Safety in Welding and Cutting and Allied Processes

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-01 Preconstruction Submittals

## Welding Quality Assurance Plan

## SD-03 Product Data

Welding Procedure Qualifications; G[, [\_\_\_\_]]  
Welder, Welding Operator, and Tacker Qualification  
Inspector Qualification  
Previous Qualifications  
Pre-Qualified Procedures  
Welding Electrodes and Rods

## SD-06 Test Reports

## Nondestructive Testing

## SD-07 Certificates

Certified Welding Procedure Specifications (WPS)  
 Certified Brazing Procedure Specifications (BPS)  
 Certified Procedure Qualification Records (PQR)  
 Certified Welder Performance Qualifications (WPQ)  
 Certified Brazer Performance Qualifications (BPQ)

## 1.3 QUALITY ASSURANCE

Except for pre-qualified (in accordance with AWS D1.1/D1.1M) and previously qualified procedures, each Contractor performing welding must record in detail and qualify the welding procedure specification for any welding procedure followed in the fabrication of weldments. Conform welding procedure qualifications to AWS D1.1/D1.1M and to the specifications in this section. Submit for approval copies of the welding procedure specification and the results of the procedure qualification test records for each type of welding which requires procedure qualification and the welder, welding operator, or tackler qualification test records. Approval of any procedure, however, does not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the specified requirements. Submit this information on the forms in Annex M of AWS D1.1/D1.1M. Individually identify and clearly reference on the detail drawings and erection drawings all welding procedure specifications, or suitably key them to the contract drawings. In case of conflict between this specification and AWS D1.1/D1.1M, this specification governs.

## 1.3.1 General Requirements

Fabricate work in an AISC Certified Fabrication Plant, Category Std . Work must be erected by an AISC Certified Erector, Category ASCE.

## a. For Structural Projects, provide documentation of the following:

- (1) Component Thickness 1/8 inch and greater: Qualification documents (WPS, PQR, and WPQ) in accordance with AWS D1.1/D1.1M.

## b. For other applications, provide documentation of the following:

- (1) Submit two copies of the Certified Welding Procedure Specifications (WPS), Certified Brazing Procedure Specifications (BPS) and Certified Procedure Qualification Records (PQR) to the Contracting Officer for [approval] [review].
- (2) Submit two copies of the Certified Welder Performance Qualifications (WPQ) and Certified Brazer Performance Qualifications (BPQ) to the Contracting Officer for [approval] [review] within fifteen calendar days prior to any employee welding on the project material.

### 1.3.2 Previous Qualifications

Welding procedures previously qualified by test may be accepted for this contract without re-qualification, upon receipt of the test results, if the following conditions are met:

- a. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.
- b. The qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.
- c. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

### 1.3.3 Pre-qualified Procedures

[Welding procedures which are considered pre-qualified as specified in AWS D1.1/D1.1M will be accepted without further qualification. Submit for approval a listing or an annotated drawing to indicate the joints not pre-qualified. Procedure qualification is mandatory for these joints.]  
[No pre-qualified welding procedures are allowed. Qualify the welding procedures and welders by tests prescribed in the applicable code or specification notwithstanding the fact the code or specification may allow pre-qualified procedures.]

### 1.3.4 Retests

If welding procedure fails to meet the requirements of AWS D1.1/D1.1M, revise and re-qualify the procedure specification, or at the Contractor's option, welding procedure may be retested in accordance with AWS D1.1/D1.1M. If the welding procedure is qualified through retesting, submit all test results, including those of test welds that failed to meet the requirements, with the welding procedure.

### 1.3.5 Welder, Welding Operator, and Tacker Qualification

Each welder, welding operator, and tacker assigned to work on this contract must be qualified in accordance with the applicable requirements of AWS D1.1/D1.1M and as specified in this section. Welders, welding operators, and tackers who make acceptable procedure qualification test welds will be considered qualified for the welding procedure used.

#### 1.3.5.1 Previous Personnel Qualifications

At the discretion of the Contracting Officer, welders, welding operators, and tackers qualified by test within the previous 6 months may be accepted for this contract without re-qualification if all the following conditions are met:

- a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tacker qualification test records are submitted and approved in accordance with the specified requirements for detail drawings.
- b. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.

- c. The previously qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.
- d. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

#### 1.3.5.2 Certificates

Before assigning any welder, welding operator, or tacker to work under this contract, submit the names of the welders, welding operators, and tackers to be employed, and certification that each individual is qualified as specified. State in the certification the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests. Keep the certification current, on file, and furnish 3 copies.

#### 1.3.5.3 Renewal of Qualification

Re-qualification of a welder or welding operator is required under any of the following conditions:

- a. It has been more than 6 months since the welder or welding operator has used the specific welding process for which he is qualified.
- b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these specifications.
- c. The welder or welding operator was qualified by an employer other than those firms performing work under this contract, and a qualification test has not been taken within the past 12 months. Submit as evidence of conformance all records showing periods of employment, name of employer where welder, or welding operator, was last employed, and the process for which qualified.
- d. A tacker who passes the qualification test is considered eligible to perform tack welding indefinitely in the positions and with the processes for which he/she is qualified, unless there is some specific reason to question the tacker's ability. In such a case, the tacker is required to pass the prescribed tack welding test.

#### 1.3.6 Inspector Qualification

[Submit inspector qualifications that are in accordance with AWS D1.1/D1.1M . Qualify all nondestructive testing personnel in accordance with the requirements of ANSI/ASNT CP-189 for Levels I or II in the applicable nondestructive testing method. The inspector may be supported by assistant welding inspectors who are not qualified to AWS D1.1/D1.1M, and assistant inspectors may perform specific inspection functions under the supervision of the qualified inspector, as allowed by AWS D1.1/D1.1M.]

#### 1.3.7 Symbols and Safety

Use symbols in accordance with AWS A2.4, unless otherwise indicated.

Follow safe welding practices and safety precautions during welding in conformance with AWS Z49.1.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Conform the design of welded connections to AISC 360, unless otherwise indicated or specified. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved. Perform welding as specified in this section, except where additional requirements are shown on the drawings or are specified in other sections. Do not commence welding until welding procedures, inspectors, nondestructive testing personnel, welders, welding operators, and tackers have been qualified and the submittals approved by the Contracting Officer. Perform all testing at or near the work site. Maintain records of the test results obtained in welding procedure, welder, welding operator, and tacker performance qualifications.

#### 2.1.1 Pre-erection Conference

Not Applicable.

### 2.2 WELDING EQUIPMENT AND MATERIALS

Provide all welding equipment, welding electrodes and rods, welding wire, and fluxes capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures. Use E70XX welding electrodes. Provide welding equipment and materials that comply with the applicable requirements of AWS D1.1/D1.1M. Submit product data on welding electrodes and rods.

## PART 3 EXECUTION

### 3.1 WELDING OPERATIONS

#### 3.1.1 Requirements

Conform workmanship and techniques for welded construction to the requirements of AWS D1.1/D1.1M and AISC 360. When AWS D1.1/D1.1M and the AISC 360 specification conflict, the requirements of AWS D1.1/D1.1M govern.

#### 3.1.2 Identification

Identify all welds in one of the following ways:

- a. Submit written records to indicate the location of welds made by each welder, welding operator, or tacker.
- b. Identify all work performed by each welder, welding operator, or tacker with an assigned number, letter, or symbol to identify welds made by that individual. The Contracting Officer may require welders, welding operators, and tackers to apply their symbol next to the weld by means of rubber stamp, felt-tipped marker with waterproof ink, or other methods that do not cause an indentation in the metal. Place the identification mark for seam welds adjacent to the weld at 3 foot intervals. Identification with die stamps or electric etchers is not allowed.

### 3.2 QUALITY CONTROL

Perform testing using an approved inspection or testing laboratory or technical consultant; or if approved, the Contractor's inspection and testing personnel may be used instead of the commercial inspection or testing laboratory or technical consultant. Perform visual [and] [ultrasonic,] [magnetic particle,] [and] [liquid penetrant] [dye penetrant] inspections to determine conformance with paragraph STANDARDS OF ACCEPTANCE. Conform procedures and techniques for inspection with applicable requirements of AWS D1.1/D1.1M. Submit a Welding Quality Assurance Plan and records of tests and inspections.

### 3.3 STANDARDS OF ACCEPTANCE

Conform dimensional tolerances for welded construction, details of welds, and quality of welds with the applicable requirements of AWS D1.1/D1.1M and the contract drawings. Perform nondestructive testing by visual inspection [and ultrasonic,] [magnetic particle,] [or] [dye penetrant] methods. The minimum extent of nondestructive testing must be random 50 percent of welds or joints, as indicated on the drawings. Submit all records of nondestructive testing.

#### 3.3.1 Nondestructive Testing

The welding is subject to inspection and tests in the mill, shop, and field. Inspection and tests in the mill or shop do not relieve the Contractor of the responsibility to furnish weldments of satisfactory quality. When materials or workmanship do not conform to the specification requirements, the Government reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment. Any indication of a defect is regarded as a defect, unless re-evaluation by nondestructive methods or by surface conditioning shows that no unacceptable defect is present. Submit all records of nondestructive testing in accordance with paragraph STANDARDS OF ACCEPTANCE.

#### 3.3.2 Destructive Tests

Make all repairs when metallographic specimens are removed from any part of a structure. Employ only qualified welders or welding operators, and use the proper joints and welding procedures, including peening or heat treatment if required, to develop the full strength of the members and joints cut and to relieve residual stress.

### 3.4 GOVERNMENT INSPECTION AND TESTING

In addition to the inspection and tests performed by the Contractor for quality control, the Government will perform inspection and testing for acceptance to the extent determined by the Contracting Officer. The costs of such inspection and testing will be borne by the Contractor if unsatisfactory welds are discovered, or by the Government if the welds are satisfactory. The work may be performed by the Government's own forces or under a separate contract for inspection and testing. The Government reserves the right to perform supplemental nondestructive and destructive tests to determine compliance with paragraph STANDARDS OF ACCEPTANCE.

### 3.5 CORRECTIONS AND REPAIRS

If inspection or testing indicates defects in the weld joints, repair

defective welds using a qualified welder or welding operator as applicable. Conduct corrections in accordance with the requirements of AWS D1.1/D1.1M and the specifications. Repair all defects in accordance with the approved procedures. Repair defects discovered between passes before additional weld material is deposited. Wherever a defect is removed and repair by welding is not required, blend the affected area into the surrounding surface to eliminate sharp notches, crevices, or corners. After a defect is thought to have been removed, and before re-welding, examine the area by suitable methods to ensure that the defect has been eliminated. Repaired welds must meet the inspection requirements for the original welds.

-- End of Section --

## SECTION 05 12 00

## STRUCTURAL STEEL

05/14

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2016) Code of Standard Practice for Steel Buildings and Bridges
AISC 325	(2011; Errata 1 2012; Errata 2 2013; Errata 3 2015) Steel Construction Manual
AISC 326	(2009) Detailing for Steel Construction
AISC 360	(2016) Specification for Structural Steel Buildings
AISC DESIGN GUIDE 10	(1997) Erection Bracing of Low-Rise Structural Steel Buildings

## AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(2012) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	(2015; Errata 1 2015; Errata 2 2016) Structural Welding Code - Steel

## ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2015) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A143/A143M	(2007; R 2014) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A307	(2014; E 2017) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A500/A500M	(2013) Standard Specification for Cold-Formed Welded and Seamless Carbon

## Steel Structural Tubing in Rounds and Shapes

ASTM A563	(2015) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A780/A780M	(2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM C827/C827M	(2016) Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
ASTM F1554	(2015; E 2016; E 2017) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F2329	(2013) Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
ASTM F844	(2007a; R 2013) Washers, Steel, Plain (Flat), Unhardened for General Use

## SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning
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## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-01 Preconstruction Submittals

Erection Drawings; G

### SD-02 Shop Drawings

Fabrication Drawings Including Description of Connections; G

### SD-03 Product Data

Shop Primer

Welding Electrodes and Rods  
Direct Tension Indicator Washers

Non-Shrink Grout

Tension Control BoltsSD-06 Test Reports

Class B Coating

Bolts, Nuts, and Washers

Weld Inspection Reports

Direct Tension Indicator Washer Inspection Reports

] Bolt Testing Reports Embrittlement Test Reports

SD-07 Certificates

Steel

Bolts, Nuts, and Washers

Galvanizing

AISC Fabrication Plant Quality Certification

AISC Erector Quality Certification

Welding Procedures and Qualifications

Welding Electrodes and Rods

### 1.3 AISC QUALITY CERTIFICATION

Work must be fabricated in an AISC Certified Fabrication Plant. Submit [AISC fabrication plant quality certification](#).

Work must be erected by an AISC Certified Erector. Submit [AISC erector quality certification](#).

### 1.4 SEISMIC PROVISIONS

[Not Applicable.](#)

### ]1.5 QUALITY ASSURANCE

#### 1.5.1 Preconstruction Submittals

##### 1.5.1.1 [Erection Drawings](#)

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing. The erection drawings must conform to [AISC 303](#). Erection drawings must be reviewed, stamped and sealed by a registered professional engineer.

#### 1.5.2 Fabrication Drawing Requirements

Submit [fabrication drawings](#) for approval prior to fabrication. Prepare in accordance with [AISC 326](#) and [AISC 325](#). Fabrication drawings must not be reproductions of contract drawings. [Sign and seal fabrication drawings by a registered professional engineer.] Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use [AWS A2.4](#) standard welding symbols. [Shoring and temporary bracing must be designed and

sealed by a registered professional engineer and submitted for record purposes[, with calculations,] as part of the drawings.] Any deviations from the details shown on the contract drawings must be clearly highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings.

### 1.5.3 Certifications

#### 1.5.3.1 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. [If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate must be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.]

Conform to all requirements specified in AWS D1.1/D1.1M.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Provide the structural steel system, including [shop primer] [galvanizing], complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing must be provided in accordance with AISC 360 except as modified in this contract.

### 2.2 STEEL

#### 2.2.1 Structural Steel

Angles ASTM A36/A36M. Plates, ASTM A572/A572M, Grade 50.

#### 2.2.2 Structural Steel Tubing

ASTM A500/A500M, Grade

#### 2.2.3 Steel Pipe

Not Applicable.

### 2.3 BOLTS, NUTS, AND WASHERS

Submit the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

#### 2.3.1 Common Grade Bolts

##### 2.3.1.1 Bolts

Not Applicable.

2.3.1.2 Nuts

Not Applicable.

2.3.1.3 Washers

Not Applicable.

2.3.2 High-Strength Bolts

2.3.2.1 Bolts

Not Applicable.

2.3.2.2 Nuts

Not Applicable.

2.3.2.3 Direct Tension Indicator Washers

Not Applicable.

2.3.2.4 Washers

Not Applicable.

2.3.3 Tension Control Bolts

Not Applicable.

2.3.4 Foundation Anchorage

2.3.4.1 Anchor Rods

ASTM F1554 Gr 55, Class 1A.

2.3.4.2 Anchor Nuts

ASTM A563, Grade A, hex style.

2.3.4.3 Anchor Washers

ASTM F844.

2.3.4.4 Anchor Plate Washers

ASTM A36/A36M.

2.4 STRUCTURAL STEEL ACCESSORIES

2.4.1 Welding Electrodes and Rods

AWS D1.1/D1.1M.

2.4.2 Non-Shrink Grout

ASTM C1107/C1107M, with no ASTM C827/C827M shrinkage. Grout must be nonmetallic.

#### 2.4.3 Welded Shear Stud Connectors

Not Applicable.

#### 2.4.4 Pins and Rollers

Not Applicable.

### 2.5 GALVANIZING

ASTM F2329 for all threaded parts including anchor bolts and nuts or ASTM A123/A123M for all structural steel members including but not limited to tubes, plates, angles, washer plates and et cetera unless specified otherwise galvanize after fabrication where practicable.

### 2.6 FABRICATION

Fabrication must be in accordance with the applicable provisions of AISC 325. Fabrication and assembly must be done in the shop to the greatest extent possible. Punch, subpunch and ream, or drill bolt and pin holes perpendicular to the surface of the member.

#### 2.6.1 Markings

Prior to erection, members must be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections must be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations.

#### 2.6.2 Shop Primer

Not Applicable.

Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the Contracting Officer. Repair damaged primed surfaces with an additional coat of primer.

##### 2.6.2.1 Cleaning

SSPC SP 6/NACE No.3. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

#### 2.6.3 Coated Surfaces

Not Applicable.

#### 2.6.4 Surface Finishes

Not Applicable.

### 2.7 DRAINAGE HOLES

Not Applicable.

## PART 3 EXECUTION

### 3.1 ERECTION

- a. Erection of structural steel, except as indicated in item b. below, must be in accordance with the applicable provisions of **AISC 325**.
- b. For low-rise structural steel buildings ( **60 feet** tall or less and a maximum of 2 stories), the structure must be erected in accordance with **AISC DESIGN GUIDE 10**.

After final positioning of steel members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

#### 3.1.1 STORAGE

Material must be stored out of contact with the ground in such manner and location as will minimize deterioration.

### 3.2 CONNECTIONS

Except as modified in this section, connections not detailed must be designed in accordance with **AISC 360**. Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Holes must not be cut or enlarged by burning. Bolts, nuts, and washers must be clean of dirt and rust, and lubricated immediately prior to installation.

#### 3.2.1 Common Grade Bolts

**ASTM A307** bolts must be tightened to a "snug tight" fit. "Snug tight" is the tightness that exists when plies in a joint are in firm contact. If firm contact of joint plies cannot be obtained with a few impacts of an impact wrench, or the full effort of a man using a spud wrench, contact the Contracting Officer for further instructions.

#### 3.2.2 High-Strength Bolts

**Not Applicable.**

##### 3.2.2.1 Installation of Direct Tension Indicator Washers (DTIW)

**Not Applicable.**

#### 3.2.3 Tension Control Bolts

**Not Applicable.**

### 3.3 GAS CUTTING

Use of gas-cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the Contracting Officer.

### 3.4 WELDING

Welding must be in accordance with **AWS D1.1/D1.1M**. Provide

AWS D1.1/D1.1M qualified welders, welding operators, and tackers.

Develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Prequalified procedures may be submitted for information only; however, procedures that are not prequalified must be submitted for approval.

#### 3.4.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Not Applicable.

#### 3.5 SHOP PRIMER REPAIR

Not Applicable.

##### 3.5.1 Field Priming

Not Applicable.

#### 3.6 GALVANIZING REPAIR

Repair damage to galvanized coatings using ASTM A780/A780M zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

#### 3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing[, except that electric power for field tests will be furnished as set forth in Division 1]. The Contracting Officer must be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of the inspection.

##### 3.7.1 Welds

###### 3.7.1.1 Visual Inspection

AWS D1.1/D1.1M. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections.

Inspection by the Government will include proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use.

Inspect proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use.

###### 3.7.1.2 Nondestructive Testing

Nondestructive testing must be in accordance with AWS D1.1/D1.1M. Test locations must be selected by the Contracting Officer. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder must be tested by ultrasonic testing, as approved by the Contracting Officer. When all welds made by an individual welder are required to be tested, magnetic particle testing must be used only in areas inaccessible to ultrasonic testing. Retest defective areas after repair. Submit weld inspection reports.

Ultrasonic or magnetic particle testing method shall be performed if any weld does not pass visual inspection.

3.7.2 Direct Tension Indicator Washers

3.7.2.1 Direct Tension Indicator Washer Compression

Not Applicable..

3.7.3 High-Strength Bolts not used.

3.7.3.1 Testing Bolt, Nut, and Washer Assemblies

Not Applicable.

3.7.3.2 Inspection

Not Applicable.

3.7.3.3 Testing

Not Applicable.

3.7.4 Testing for Embrittlement

ASTM A143/A143M for steel products hot-dip galvanized after fabrication.  
Submit embrittlement test reports.

-- End of Section --

## SECTION 05 50 14

STRUCTURAL METAL FABRICATIONS  
05/14

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2015; Errata 1 2015; Errata 2 2016)  
Structural Welding Code - Steel

## ASTM INTERNATIONAL (ASTM)

ASTM A325 (2014) Standard Specification for  
Structural Bolts, Steel, Heat Treated,  
120/105 ksi Minimum Tensile Strength

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-02 Shop Drawings

Detail Drawings; G  
Welding of Structural Steel  
Structural Steel Welding Repairs  
Castings

## SD-03 Product Data

Filler Metal  
Lubricant

## SD-06 Test Reports

Tests, Inspections, and Verifications

## SD-07 Certificates

Welding Qualifications  
Application Qualification for Steel Studs; G  
Welding of Aluminum

### 1.3 QUALITY ASSURANCE

#### 1.3.1 Detail Drawings

Submit detail drawings for metalwork and machine work, prior to fabrication, include within the detail drawings catalog cuts, templates, fabrication and assembly details and type, grade and class of material as appropriate. Indicate methods of protecting the work during shipping, storage, field assembly, and installation.

#### 1.3.2 Welding Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. [If the qualification date of the welding operator is more than one-year old, accompany the welding operator's qualification certificate with a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.]

Conform to all requirements specified in AWS D1.1/D1.1M.

## PART 2 PRODUCTS

### 2.1 FABRICATION

#### 2.1.1 Structural Fabrication

Material must be straight before being laid off or worked. Perform straightening, if necessary, by methods that will not impair the metal. Sharp kinks or bends will be cause for rejection of the material. Material with welds will not be accepted except where welding is definitely specified, indicated or otherwise approved. Make bends using approved dies, press brakes or bending rolls. Where heating is required, take precautions to avoid overheating the metal and allow it to cool in a manner that will not impair the original properties of the metal. Proposed flame cutting of material, other than structural steel, is subject to approval and must be indicated on detail drawings. Shearing shall be accurate and all portions of the work neatly finished. Make corners square and true unless otherwise shown. Fillet re-entrant cuts to a minimum radius of 3/4 inch unless otherwise approved. Provide finished members free of twists, bends and open joints. Tighten bolts, nuts and screws.

##### 2.1.1.1 Dimensional Tolerances for Structural Work

Measure dimensions using an approved calibrated steel tape of approximately the same temperature as the material being measured. The overall dimensions of an assembled structural unit must be within the tolerances indicated on the drawings or as specified in the particular section of these specifications for the item of work. Where tolerances are not specified in other sections of these specifications or shown, an allowable variation of 1/32 inch is permissible in the overall length of component members with both ends milled; component members without milled ends must not deviate from the dimensions shown by more than 1/16 inch for members 30 feet or less in length, and by more than 1/8 inch for members over 30 feet in length.

#### 2.1.1.2 Structural Steel Fabrication

Structural steel may be cut by mechanically guided or hand-guided torches, provided an accurate profile with a surface that is smooth and free from cracks and notches is obtained. Prepare surfaces and edges in accordance with [AWS D1.1/D1.1M](#), Subclause 3.2. Where structural steel is not to be welded, chipping or grinding will not be required except as necessary to remove slag and sharp edges of mechanically guided or hand-guided cuts not exposed to view. Chip, grind or machine to sound metal hand-guided cuts which are to be exposed or visible.

#### 2.1.1.3 Structural Aluminum Fabrication

Not Applicable.

#### 2.1.2 Welding

##### 2.1.2.1 Welding of Structural Steel

###### 2.1.2.1.1 Welding Procedures for Structural Steel

Prequalify welding procedures for structural steel as described in [AWS D1.1/D1.1M](#), Subclause 3.1 or qualify by tests as prescribed in [AWS D1.1/D1.1M](#), Clause 4. Properly documented evidence of compliance with all requirements of these specifications for previous qualification tests establish a welding procedure as prequalified. For welding procedures qualified by tests, the test welding and specimen testing will be witnessed and the test report document signed by the Contracting Officer. Approval of any welding procedure will not relieve the responsibility for producing a finished structure meeting all requirements of these specifications. The Contractor will be directed or authorized to make any changes in previously approved welding procedures that are deemed necessary or desirable by the Contractor Officer.

- a. Submit a complete schedule of welding procedures for each steel structure to be welded prior to commencing fabrication. Provide the schedule in conformance with the requirements specified in the provisions [AWS D1.1/D1.1M](#), Clauses 2, 3, 4, 6, 7 and applicable portions of Clause 8.
- b. Provide within the schedule detailed procedure specifications and tables or diagrams showing the procedures to be used for each required joint. Include in the welding procedures filler metal, preheat, interpass temperature and stress-relief heat treatment requirements. Clearly identify each welding procedure as being prequalified or required to be qualified by tests.
- c. Show types and locations of welds designated or in the specifications to receive nondestructive testing in the welding procedures.

###### 2.1.2.1.2 Welding Process

Perform welding of structural steel by an electric arc welding process using a method which excludes the atmosphere from the molten metal and conforms to the applicable provisions of [AWS D1.1/D1.1M](#). Minimize residual stresses, distortion and shrinkage from welding.

### 2.1.2.1.3 Welding Technique

#### 2.1.2.1.3.1 Filler Metal

Provide the electrode, electrode-flux combination and grade of weld metal conforming to the appropriate AWS specification for the base metal and welding process being used or be as shown where a specific choice of AWS specification allowables is required. Include the AWS designation of the electrodes to be used in the schedule of welding procedures. Use only low hydrogen electrodes for manual shielded metal-arc welding regardless of the thickness of the steel. Use a controlled temperature storage oven at the job site as prescribed by AWS D1.1/D1.1M, Subclause 3.5 to maintain low moisture of low hydrogen electrodes.

#### 2.1.2.1.3.2 Preheat and Interpass Temperature

Perform preheating as required by AWS D1.1/D1.1M, Subclause 3.5 or as otherwise specified except that the temperature of the base metal must be at least 70 degrees F. Slowly and uniformly preheat the weldments by approved means to the prescribed temperature, held at that temperature until the welding is completed and then permitted to cool slowly in still air.

#### 2.1.2.1.3.3 Stress-Relief Heat Treatment

Where stress relief heat treatment is specified or shown, perform in accordance with the requirements of AWS D1.1/D1.1M, Subclause 5.8 unless otherwise authorized or directed.

#### 2.1.2.1.4 Workmanship

Perform welding workmanship in accordance with AWS D1.1/D1.1M, Clause 3 and other applicable requirements of these specifications.

##### 2.1.2.1.4.1 Preparation of Base Metal

Prior to welding inspect surfaces to be welded to ensure compliance with AWS D1.1/D1.1M, Subclause 3.2.

##### 2.1.2.1.4.2 Temporary Welds

Make temporary welds, required for fabrication and erection, under the controlled conditions prescribed for permanent work. Make temporary welds using low-hydrogen welding electrodes and by welders qualified for permanent work as specified in these specifications. Conduct preheating for temporary welds as required by AWS D1.1/D1.1M for permanent welds except that the minimum temperature must be 120 degrees F in any case. In making temporary welds, do not strike arcs in other than weld locations. Remove each temporary weld and grind flush with adjacent surfaces after serving its purpose.

##### 2.1.2.1.4.3 Tack Welds

Subject tack welds that are to be incorporated into the permanent work to the same quality requirements as the permanent welds; clean and thoroughly fuse them with permanent welds. Perform preheating as specified above for temporary welds. Multiple-pass tack welds must have cascaded ends. Remove defective tack welds before permanent welding.

#### 2.1.2.2 Welding of Steel Castings

Not Applicable.

#### 2.1.2.3 Welding of Steel Studs

Not Applicable.

##### 2.1.2.3.1 Application Qualification for Steel Studs

Not Applicable.

##### 2.1.2.3.2 Production Quality Control

Conform to the requirements of AWS D1.1/D1.1M, Subclause 7.7, except as otherwise specified for quality control for production welding of studs. Weld studs on which pre-production testing is to be performed in the same general position as required on production studs (flat, vertical, overhead or sloping). If the reduction of the length of studs becomes less than normal as they are welded, stop welding immediately and do not resume until the cause has been corrected.

#### 2.1.2.4 Welding of Aluminum

Not Applicable.

#### 2.1.3 Bolted Connections

##### 2.1.3.1 Bolted Structural Steel Connections

Provide bolts, nuts and washers of the type specified or indicated. Equip all nuts with washers except for high strength bolts. Use beveled washers where bearing faces have a slope of more than 1:20 with respect to a plane normal to the bolt axis. Where the use of high strength bolts is specified or indicated, the materials, conform workmanship and installation to the applicable provisions of ASTM A325.

- a. Accurately locate bolt holes, smooth, perpendicular to the member and cylindrical.
- b. Drill or subdrill holes for regular bolts and ream in the shop and not more than 1/16 inch larger than the diameter of the bolt.
- c. Match-ream or drill holes for fitted bolts in the shop. Remove burrs resulting from reaming. Keep bolt threads entirely outside of the holes. The body diameter of bolts must have tolerances as recommended by ASME B4.1 for the class of fit specified. Place fitted bolts in reamed holes by selective assembly to provide an LN-2 fit.
- d. Holes for high strength bolts must not have diameters more than 1/16 inch larger than bolt diameters. If the thickness of the material is not greater than the diameter of the bolts, the holes may be punched. If the thickness of the material is greater than the diameter of the bolts the holes may be drilled full size or subpunched or subdrilled at least 1/8 inch smaller than the diameter of the bolts and then reamed to full size. Poor matching of holes will be cause for rejection. Drifting occurring during assembly cannot distort the metal or enlarge the holes. Reaming to a larger diameter of the next standard size bolt will be allowed for slight mismatching.

2.1.3.2 Bolted Aluminum Connections

Not Applicable.

2.1.4 Riveted Aluminum Connections

Not Applicable.

2.1.5 Patterns

Not Applicable

2.1.6 Castings

Not Applicable.

2.1.7 Machine Work

Not Applicable.

2.1.7.1 Finished Surfaces

Not Applicable.

2.1.7.2 Unfinished Surfaces

Not Applicable.

2.1.7.3 Pin Holes

Not Applicable.

2.1.7.4 Gears

Not Applicable.

2.1.7.5 Shafting

Not Applicable.

2.1.7.6 Bearings

Not Applicable.

2.1.8 Miscellaneous Provisions

2.1.8.1 Metallic Coatings

Not Applicable.

2.1.8.2 Cleaning of Corrosion-Resisting Steel

Not Applicable.

2.1.8.3 Lubrication

Not Applicable.

#### 2.1.9 Shop Assembly

Not Applicabled.

### 2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

Perform material tests and analyses certified by an approved laboratory to demonstrate that materials are in conformity with the specifications. These tests and analyses shall be performed and certified at the Contractor's expense. Perform tests, inspections, and verifications conforming to the requirements of the particular sections of these specifications for the respective items of work unless otherwise specified or authorized. Conduct tests in the presence of the Contracting Officer if so required. Furnish specimens and samples for additional independent tests and analyses upon request by the Contracting Officer. Properly label specimens and samples and prepare for shipment. Submit certified test reports for materials with all materials delivered to the site.

#### 2.2.1 Nondestructive Testing

Not Applicable.

#### 2.2.2 Tests of Machinery and Structural Units

Not Applicable.

#### 2.2.3 Inspection of Structural Steel Welding

Nondestructive testing of designated welds will be required. Supplemental examination of any joint or coupon cut from any location in any joint may be required.

##### 2.2.3.1 Visual Examination

For all visual examination of completed welds clean and carefully examine for insufficient throat or leg sizes, cracks, undercutting, overlap, excessive convexity or reinforcement and other surface defects to ensure compliance with the requirements of AWS D1.1/D1.1M, Clause 6, Subclause 6.9, Part C.

##### 2.2.3.2 Nondestructive Testing

Perform as designated or described in the sections of these specifications, the nondestructive testing of shop and field welds covering the particular items of work.

##### 2.2.3.2.1 Testing Agency

The nondestructive testing of welds and the evaluation of tests as to the acceptability of the welds must be performed by a testing agency adequately equipped and competent to perform such services or by the Contractor using suitable equipment and qualified personnel. In either case, written approval of the examination procedures is required and perform the examination tests in the presence of the Contracting Officer. The evaluation of tests are subject to the approval and all records become the property of the Government.

#### 2.2.3.2.2 Examination Procedures

Conform to the following requirements.

##### 2.2.3.2.2.1 Ultrasonic Testing

Make, evaluate and report ultrasonic testing of welds in conform to the requirements of [AWS D1.1/D1.1M](#), Clause 6, Part C. Provide ultrasonic equipment capable of making a permanent record of the test indications. Make a record of each weld tested.

##### 2.2.3.2.2.2 Magnetic Particle Inspection

Conform magnetic particle inspection of welds to the applicable provisions of [ASTM E709](#).

##### 2.2.3.2.2.3 Dye Penetrant Inspection

Perform dye penetrant inspection of welds conforming to the applicable provisions of [ASTM E165/E165M](#).

##### 2.2.3.2.3 Acceptability of Welds

Welds will be unacceptable if shown to have defects prohibited by [AWS D1.1/D1.1M](#), or possess any degree of incomplete fusion, inadequate penetration or undercutting.

##### 2.2.3.2.4 Welds to be Subject to Nondestructive Testing

Not Applicable.

#### 2.2.3.3 Test Coupons

The Government reserves the right to require the Contractor to remove coupons from completed work when doubt as to soundness cannot be resolved by nondestructive testing. Should tests of any two coupons cut from the work of any welder show strengths less than that specified for the base metal it will be considered evidence of negligence or incompetence and such welder will be removed from the work. When coupons are removed from any part of a structure, repair the members cut in a neat manner with joints of the proper type to develop the full strength of the members. Peen repaired joints as approved or directed to relieve residual stress. The expense for removing and testing coupons, repairing cut members and the nondestructive testing of repairs is borne by the Government or the Contractor in accordance with the Contract Clauses INSPECTION AND ACCEPTANCE.

#### 2.2.3.4 Supplemental Examination

When the soundness of any weld is suspected of being deficient due to faulty welding or stresses that might occur during shipment or erection, the Government reserves the right to perform nondestructive supplemental examinations before final acceptance. The cost of such inspection will be borne by the Government.

#### 2.2.4 Structural Steel Welding Repairs

Repair defective welds in the structural steel welding repairs in accordance with [AWS D1.1/D1.1M](#), Subclause 3.7. Remove defective weld

metal to sound metal by use of air carbon-arc or oxygen gouging. Do not use oxygen gouging on ASTM A514/A514M steel. Thoroughly clean surfaces before welding. Retest welds that have been repaired by the same methods used in the original inspection. Except for the repair of members cut to remove test coupons and found to have acceptable welds costs of repairs and retesting will be borne by the Contractor. Submit welding repair plans for steel, prior to making repairs.

#### 2.2.5 Inspection and Testing of Steel Stud Welding

Not Applicable.

#### 2.2.6 Inspection of Steel Castings

Not Applicable.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Thoroughly clean all parts to be installed. Remove packing compounds, rust, dirt, grit and other foreign matter. Clean holes and grooves for lubrication. Examine enclosed chambers or passages to make sure that they are free from damaging materials. Where units or items are shipped as assemblies they will be inspected prior to installation. Disassembly, cleaning and lubrication will not be required except where necessary to place the assembly in a clean and properly lubricated condition. Do not use pipe wrenches, cold chisels or other tools likely to cause damage to the surfaces of rods, nuts or other parts used for assembling and tightening parts. Tighten bolts and screws firmly and uniformly but take care not to overstress the threads. When a half nut is used for locking a full nut place the half nut first followed by the full nut. Lubricate threads of all bolts except high strength bolts, nuts and screws with an appropriate lubricant before assembly. Coat threads of corrosion-resisting steel bolts and nuts with an approved antigalling compound. Driving and drifting bolts or keys will not be permitted.

##### 3.1.1 Alignment and Setting

Accurately align each machinery or structural unit by the use of steel shims or other approved methods so that no binding in any moving parts or distortion of any member occurs before it is fastened in place. The alignment of all parts with respect to each other must be true within the respective tolerances required. Set true machines to the elevations shown.

##### 3.1.2 Blocking and Wedges

Remove all blocking and wedges used during installation for the support of parts to be grouted in foundations before final grouting unless otherwise directed. Blocking and wedges left in the foundations with approval must be of steel or iron.

##### 3.1.3 Foundations and Grouting

Concrete subbases and frames and final grout under parts of machines in accordance with the procedures as specified in Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE.

### 3.2 TESTS

#### 3.2.1 Workmanship

Workmanship must be of the highest grade and in accordance with the best modern practices to conform with the specifications for the item of work being furnished.

#### 3.2.2 Production Welding

Perform production welding conforming to the requirements of AWS D1.1/D1.1M or AWS D1.2/D1.2M, as applicable. Studs, on which pre-production testing is to be performed, must be welded in the same general position as required on production items (flat, vertical, overhead or sloping). Test and production stud welding will be subjected to visual examination or inspection. If the reduction of the length of studs becomes less than normal as they are welded, stop welding immediately and do not resume until the cause has been corrected.

### 3.3 PROTECTION OF FINISHED WORK

#### 3.3.1 Machined Surfaces

Not Applicable.

#### 3.3.2 Lubrication After Assembly

Not Applicable.

#### 3.3.3 Aluminum

Not Applicable.

-- End of Section --

SECTION 09 01 90.50

PREPARATION OF HISTORIC WOOD AND METAL SURFACES FOR PAINTING  
05/09

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100 (2015; Suppl 2002-2016) Documentation of the Threshold Limit Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM D173/D173M (2003; R 2011; E 2012) Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing

ASTM D3274 (2009; R 2013) Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation

ASTM D3359 (2017) Standard Test Methods for Rating Adhesion by Tape Test

ASTM D4214 (2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC 7/NACE No.4 (2007; E 2004) Brush-Off Blast Cleaning

SSPC PA Guide 5 (2002; E 2004) Guide to Maintenance Coating of Steel Structures in Atmospheric Service

SSPC SP 1 (2015) Solvent Cleaning

SSPC SP 10/NACE No. 2 (2007) Near-White Blast Cleaning

SSPC SP 2 (1982; E 2000; E 2004) Hand Tool Cleaning

SSPC SP 3 (1982; E 2004) Power Tool Cleaning

SSPC SP 5/NACE No. 1 (2007) White Metal Blast Cleaning

SSPC SP 6/NACE No.3 (2007) Commercial Blast Cleaning

## 1.2 SUMMARY

The procedures proposed for the accomplishment of the work shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, and coordination with other work in progress. Submit the names, quantity represented, and intended use for proprietary brands of materials proposed to be substituted for the specified materials when the required quantity of a particular batch is 50 gallons or less. Submit manufacturer's current printed product description, safety data sheets (SDS) and technical data sheets for each product. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times shall be provided for each product submitted. Include in the work plan a Safety and Health plan describing procedures for handling monitoring, and disposition of VOCs and other hazardous and toxic materials. Submit one copy of the Work Plan and a certificate stating that products proposed for use meet the VOC regulations of the local Air Pollution Control Districts having jurisdiction over the geographical area in which the project is located. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations. Test the materials designated by the Contracting Officer.

## 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-03 Product Data

Work Plan; G[, [\_\_\_\_]]  
Materials  
Qualifications

### SD-07 Certificates

Work Plan

## 1.4 QUALITY ASSURANCE

Work shall comply with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in the CONTRACT CLAUSES. The Activity Hazard Analysis shall include analyses of the potential impact of surface preparation operations on personnel and on others involved in and adjacent to the work zone.

### 1.4.1 Worker Exposures

Exposure of workers to chemical substances shall not exceed limits as established by ACGIH 0100.

#### 1.4.2 Training

Inform workers, having access to an affected work area, of the contents of the applicable SDS and of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive dust, mists, and odors from the surface preparation operations. Workers involved in surface preparation and clean-up must be trained in the safe handling and application, and the exposure limit, for each material which the worker will use in the project. Instruct personnel having a need to use respirators and masks in the use and maintenance of such equipment.

#### 1.4.3 Coordination

Coordinate work to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from surface preparation and cleaning operations.

#### 1.4.4 Qualifications

Provide qualified workers trained and experienced in the preparation for painting of wood and metal surfaces in historic structures, submit documentation of 5 consecutive years of work of this type and a statement certified by the Contractor attesting that the experience and qualifications of the workers (journeymen) comply with the specifications.. Provide a list of similar jobs identifying when, where, and for whom the work was done and a current point-of-contact for identified references.

### 1.5 DELIVERY, STORAGE, AND HANDLING

Deliver paint removers, solvents, and other chemicals, used for surface preparation, in sealed containers that legibly show the designated name, formula or specification number, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name of manufacturer. Furnish such materials in containers not larger than 5 gallons; store them in accordance with the manufacturer's written directions; and, as a minimum, store them off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors and at temperatures between 40 and 95 degrees F.

### 1.6 ENVIRONMENTAL REQUIREMENTS

Unless otherwise recommended by the product manufacturer, the ambient temperature shall be between 45 and 95 degrees F when applying paint removers, solvents, or other preparation materials.

## PART 2 PRODUCTS

### 2.1 PAINT REMOVERS

Chemical paint removers shall be a commercial item specifically manufactured for the type of paint to be removed.

## 2.2 EPOXY CONSOLIDANTS

### 2.2.1 Liquid Consolidant

Provide liquid wood consolidant consisting of a 2-part, low-viscosity liquid epoxy that meets the criteria of Table 1.

### 2.2.2 Epoxy Paste

Provide epoxy paste consisting of a 2-part, thixotropic paste that meets the criteria of Table 1.

TABLE 1		
	LIQUID CONSOLIDANT	EPOXY PASTE
Properties	Low-Viscosity Liquid	No-Slump, Thixotropic Paste
Toxicity	Low	Very Low
Toxicity Cured	Non-Toxic	Non-Toxic
Ratios	1:1 by Volume	1:1 by Volume
Pot Life @ Room Temp.	30 minutes min.	50 minutes min
Hardening @ Room Temp.	1 hr. or longer	1 hr. or longer
Hardening @ 140 deg. F	16 min. or less	18 min. or less
Viscosity Poises @ 72 deg. F	4.7 max.	Thixotropic paste
Solids	95 percent min.	98 percent min.
Tensile Strength	4000 psi	2500 psi
Elongation	50 percent	4 percent
Compressive Strength		
Failure	19,000 psi	---
Yield	3500 psi	5500 psi

## PART 3 EXECUTION

### 3.1 GENERAL REQUIREMENTS

Use methods for preparation of historic wood and metal surfaces for painting which are the gentlest possible to achieve the desired results. Historic substrate materials shall not be damaged or marred in the process of surface preparations. Collect and analyze samples of the existing paint finishes for the purpose of documentation or matching, if [so directed by the Contracting Officer] [required by the contract documents.] Material and application requirements for paints are covered in Section 09 90 00 PAINTS AND COATINGS.

### 3.2 VENTILATION

Ventilate interior work zones, having a volume of 10,000 cubic feet or less, at a minimum of 2 air exchanges per hour. Maintain ventilation in larger work zones by means of mechanical exhaust. Solvent vapors shall be exhausted outdoors, away from air intakes and workers. Temporarily seal return air inlets in the work zone before start of work until the prepared surfaces have dried. Operators and personnel in the vicinity of paint removal processes involving chemicals or mechanical action (sanding or blasting) shall wear respirators.

### 3.3 PROTECTION OF AREAS NOT TO BE PAINTED

Remove or protect items not to be painted, which are in contact with or adjacent to painted surfaces, prior to surface preparation and painting operations. Replace items removed prior to painting when painting is completed. Following completion of painting, workers skilled in the trades involved shall reinstall removed items. Surfaces contaminated by preparation materials shall be restored to original condition.

### 3.4 CLEANING OF SURFACES

Surfaces to be painted shall be clean and free of grease, dirt, dust and other foreign matter before application of paint or surface treatments. After cleaning, surfaces shall exhibit a surface disfigurement rating of 7 or greater when evaluated in accordance with ASTM D3274. Dirt and surface contaminants shall be cleaned by brush with solutions of water and detergent or trisodium phosphate, then rinsed clean with water and let dry. Surfaces on which mildew or other microbiological growth is present shall be cleaned with a detergent solution containing household bleach. Oil and grease shall be removed with clean cloths and cleaning solvents prior to mechanical cleaning. Cleaning solvents shall be of low toxicity with a flashpoint in excess of 100 degrees F. Cleaning shall be programmed so that dust and other contaminants will not fall on newly prepared or newly painted surfaces.

### 3.5 EXISTING PAINT

Existing paint shall be tested for adhesion to substrate in accordance with ASTM D3359, Test Method A and shall obtain a rating of 4 or better in order to be considered sound. Existing paint meeting this requirement may be considered a satisfactory base for repainting.

### 3.6 PAINT REMOVAL

Remove flaking, cracking, blistering, peeling or otherwise deteriorated paint by scraping with hand scrapers. After scraping, removal of large areas of paint or paint on architectural details shall be accomplished using sanders, heat guns or heat plates, or chemical paint removers. Paint shall be removed to bare substrate or first sound paint layer. Open flame heat devices shall not be used. Mechanical paint removal shall not damage or mar the substrate material.

#### 3.6.1 Chemical Paint Removers

Use chemical paint removers in accordance with manufacturer's recommendations. If chemical strippers are used, substrate shall be neutralized after stripping to a pH of 5 to 8.5.

### 3.6.2 Lead Paint

In preparation of lead-based painted surfaces for repainting, follow the procedures described in Section 02 83 19.13 10 LEAD-BASED PAINT ABATEMENT.

## 3.7 SURFACE PREPARATION

After cleaning and removal of deteriorated paint, edges of remaining chipped paint shall be feather-edged and sanded smooth. Repair damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls with suitable material to match adjacent undamaged areas. Slick surfaces shall be roughened. Remove chalk so that when tested in accordance with ASTM D4214, the chalk resistance rating is no less than 8. New, proposed coatings shall be compatible with existing coatings. If existing surfaces are glossy, the gloss shall be reduced.

## 3.8 WOOD SURFACES

Wood surfaces shall be cleaned of foreign matter. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints. Small, dry seasoned knots shall be scraped, cleaned, and given a thin coat of commercial knot sealer before application of the priming coat. Pitch on large, open, unseasoned knots and all other beads or streaks of pitch shall be scraped off, or, if it is still soft, removed with mineral spirits or turpentine, and the resinous area shall be thinly coated with knot sealer.

### 3.8.1 Interior Wood Surfaces

Interior wood surfaces to receive stain shall be sanded. Oak and other open-grain wood to receive stain shall be given a coat of wood filler recommended by the finish manufacturer not less than 8 hours before the application of stain; excess filler shall be removed and the surface sanded smooth. Sanding of wood floors is specified in Section 09 64 29 WOOD STRIP AND PLANK FLOORING. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter, unless otherwise authorized.

### 3.8.2 Wood Repair

Remove and repair badly decayed areas. Replace areas and pieces decayed beyond repair with new pieces that match originals in all respects. Moderately decayed areas, weathered, or gouged wood shall be patched with approved patching compounds, and shall be sanded smooth. The source or cause of wood decay shall be identified and corrected prior to application of patching materials. Wet wood shall be completely dried to a moisture content not exceeding 12 percent, as measured by a moisture meter, to its full depth before patching, unless otherwise authorized. Wood that is to be patched shall be clean of dust, grease, and loose paint.

#### 3.8.2.1 Epoxy Wood Repair

Epoxy wood repair materials shall be applied in accordance with manufacturer's written instructions. Health and safety instructions shall be followed in accordance with the manufacturer's instructions. Clean mixing equipment shall be used to avoid contamination. Mix and proportions shall be as directed by the manufacturer. Batches shall be only large enough to complete the specific job intended. Patching

materials shall be completely cured before painting or reinstallation of patched pieces.

#### 3.8.2.2 Epoxy Consolidant and Epoxy Paste

Epoxy liquid wood consolidant shall be used: 1) to penetrate and impregnate deteriorated wood sections in order to reinforce wood fibers that have become softened or absorbent. 2) as a primer for areas that are to receive epoxy paste filler. Epoxy paste shall be used to fill areas where portions of wood are missing such as holes, cracks, gaps, gouges, and other voids.

#### 3.8.3 Exposed Ferrous Metals

Exposed ferrous metals such as nail heads on or in contact with wood surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

#### 3.8.4 Finishing Nails

Finishing nails shall be set, and all holes and surface imperfections shall be primed. After priming, holes and imperfections in finish surfaces shall be filled with putty or plastic wood filler, colored to match the finish coat if natural finish is required, allowed to dry, and sanded smooth. Putty or wood filler shall be compatible with subsequent coatings.

#### 3.8.5 Wood Preservative

Areas of bare wood in exterior locations prone to excessive moisture or standing water shall be treated with a commercial, fungicide, paintable water repellant/preservative. Water repellant/preservatives shall not be used on interior surfaces.

### 3.9 METAL SURFACES

Metal surfaces shall be cleaned of foreign matter. Programs for preparation of metal shall be in accordance with [SSPC PA Guide 5](#). Grease, oil, and other soluble contaminants shall be removed by solvent cleaning in accordance with [SSPC SP 1](#). Surfaces shall be free from soils and corrosion; e.g. grease, oil, solder flux, welding flux, weld spatter, sand, rust, scale, and other contaminants that might interfere with the application of the new finish. Cleaning methods shall be the gentlest possible to achieve the desired result. Metals which are soft, thin, or exhibit fine detail shall not be abrasively cleaned. Evidence of corrosion or contamination on a previously cleaned surface shall be cause for recleaning prior to painting.

#### 3.9.1 Ferrous Surfaces

Ferrous surfaces that contain loose rust, loose mill scale, and other foreign substances shall be cleaned mechanically with hand tools according to [SSPC SP 2](#), power tools according to [SSPC SP 3](#) or by blast cleaning according to [[SSPC SP 5/NACE No. 1](#)], [[SSPC SP 6/NACE No. 3](#)], [[SSPC 7/NACE No. 4](#)], [[SSPC SP 10/NACE No. 2](#)]. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

### 3.9.2 Nonferrous Metallic Surfaces

Galvanized, aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces shall be solvent-cleaned in accordance with SSPC SP 1.

#### 3.9.2.1 Aluminum

Aluminum surfaces shall be treated in accordance with ASTM D173/D173M or ASTM D173/D173M. Steel wool, steel brushes and uninhibited caustic etching solutions, such as sodium hydroxide, shall not be used on aluminum.

#### 3.9.2.2 Zinc

Zinc surfaces including zinc-coated substrates, shall be cleaned prior to painting as follows: degrease, soak in a mild and inhibited alkaline cleaner, rinse with clean overflowing water, clean anodically in an acid (e.g. 0.25 to 0.75 percent sulfuric acid), and rinse with clean overflowing water.

### 3.10 TIMING

Surfaces that have been cleaned, pretreated, and otherwise prepared for painting shall be given a coat of the specified first coat as soon as practical after such pretreatment has been completed, but prior to any deterioration of the prepared surface. Unless otherwise directed, the first coat primer shall be applied within 48 hours of surface preparation.

### 3.11 SURFACES TO BE PREPARED FOR PAINTING

Surfaces shall be prepared as specified and as shown in the painting schedule [in Section 09 90 00 PAINTS AND COATINGS] [on the drawings].

### 3.12 CLEANING

Place cloths, cotton waste and other debris, that might constitute a fire hazard, in closed metal containers for removal at the end of each day. Containers shall be removed from the site or destroyed in an approved manner. Preparation materials and other deposits on adjacent surfaces shall be removed and the entire job left clean and ready for painting.

-- End of Section --

SECTION 09 90 00

PAINTS AND COATINGS

05/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100 (2015; Suppl 2002-2016) Documentation of the Threshold Limit Values and Biological Exposure Indices

ASME INTERNATIONAL (ASME)

ASME A13.1 (2015) Scheme for the Identification of Piping Systems

ASTM INTERNATIONAL (ASTM)

ASTM C920 (2014a) Standard Specification for Elastomeric Joint Sealants

ASTM D235 (2002; R 2012) Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)

ASTM D2824/D2824M (2013) Aluminum-Pigmented Asphalt Roof Coatings, Non-Fibered, Asbestos Fibered, and Fibered without Asbestos

ASTM D4214 (2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films

ASTM D4263 (1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method

ASTM D4444 (2013) Use and Calibration of Hand-Held Moisture Meters

ASTM D523 (2014) Standard Test Method for Specular Gloss

ASTM D6386 (2016) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting

ASTM F1869 (2016) Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

## MASTER PAINTERS INSTITUTE (MPI)

MPI 1	(Oct 2009) Aluminum Paint
MPI 10	(Oct 2009) Exterior Latex, Flat, MPI Gloss Level 1
MPI 101	(Oct 2009) Epoxy Anti-Corrosive Metal Primer
MPI 107	(Oct 2009) Rust Inhibitive Primer (Water-Based)
MPI 108	(Oct 2009) High Build Epoxy Coating, Low Gloss
MPI 11	(Oct 2009) Exterior Latex, Semi-Gloss, MPI Gloss Level 5
MPI 113	(Oct 2009) Exterior Pigmented Elastomeric Coating (Water Based)
MPI 116	(Oct 2009) Epoxy Block Filler
MPI 119	(Oct 2009) Exterior Latex, Gloss
MPI 13	(Oct 2009) Exterior Solvent-Based Semi-Transparent Stain
MPI 134	(Oct 2009) Galvanized Primer (Waterbased)
MPI 138	(Oct 2009) Interior High Performance Latex, MPI Gloss Level 2
MPI 139	(Oct 2009) Interior High Performance Latex, MPI Gloss Level 3
MPI 140	(Oct 2009) Interior High Performance Latex, MPI Gloss Level 4
MPI 141	(Oct 2009) Interior High Performance Latex MPI Gloss Level 5
MPI 144	(Oct 2009) Institutional Low Odor / VOC Interior Latex, MPI Gloss Level 2
MPI 145	(Oct 2009) Institutional Low Odor / VOC Interior Latex, MPI Gloss Level 3
MPI 146	(Oct 2009) Institutional Low Odor/VOC Interior Latex, MPI Gloss Level 4
MPI 147	(May 2016) Institutional Low Odor / VOC Interior Latex, Semi-Gloss, MPI Gloss Level 5
MPI 151	(Oct 2009) Interior W.B. Light Industrial Coating, MPI Gloss Level 3

MPI 153	(Oct 2009) Interior W.B. Light Industrial Coating, Semi-Gloss, MPI Gloss Level 5
MPI 154	(Oct 2009) Interior W.B. Light Industrial Coating, Gloss, MPI Gloss Level 6
MPI 16	(Oct 2009) Exterior Latex-Based Solid Hide Stain
MPI 161	(Oct 2009) Exterior W.B. Light Industrial Coating, MPI Gloss Level 3
MPI 163	(Oct 2009) Exterior W.B. Light Industrial Coating, Semi-Gloss, MPI Gloss Level 5
MPI 164	(Oct 2009) Exterior W.B. Light Industrial Coating, Gloss, MPI Gloss Level 6
MPI 19	(Oct 2009) Inorganic Zinc Rich Primer
MPI 2	(Oct 2009) Aluminum Heat Resistant Enamel (up to 427 C and 800 F
MPI 21	(Oct 2009) Heat Resistant Enamel, Gloss (up to 205 degrees C and 400 degrees F), MPI Gloss Level 6
MPI 22	(Oct 2009) Aluminum Paint, High Heat (up to 590 degrees C and 1100 degrees F.
MPI 23	(Oct 2009) Surface Tolerant Metal Primer
MPI 26	(Oct 2009) Cementitious Galvanized Metal Primer
MPI 27	(Oct 2009) Exterior / Interior Alkyd Floor Enamel, Gloss
MPI 31	(Oct 2009) Polyurethane, Moisture Cured, Clear Gloss
MPI 39	(Oct 2009) Interior Latex-Based Wood Primer
MPI 4	(Oct 2009) Interior/Exterior Latex Block Filler
MPI 42	(Oct 2009) Latex Stucco and Masonry Textured Coating
MPI 44	(Oct 2009) Interior Latex, MPI Gloss Level 2
MPI 45	(Oct 2009) Interior Alkyd Primer Sealer
MPI 46	(Oct 2009) Interior Enamel Undercoat
MPI 47	(Oct 2009) Interior Alkyd, Semi-Gloss, MPI Gloss Level 5

MPI 48	(Oct 2009) Interior Alkyd, Gloss, MPI Gloss Level 6
MPI 49	(Oct 2009) Interior Alkyd, Flat, MPI Gloss Level 1
MPI 5	(Oct 2009) Exterior Alkyd Wood Primer
MPI 50	(Oct 2009) Interior Latex Primer Sealer
MPI 51	(Oct 2009) Interior Alkyd, Eggshell, MPI Gloss Level 2
MPI 52	(Oct 2009) Interior Latex, MPI Gloss Level 3
MPI 54	(Oct 2009) Interior Latex, Semi-Gloss, MPI Gloss Level 5
MPI 56	(Oct 2009) Interior Oil Modified Urethane Clear Gloss
MPI 57	(Oct 2009) Interior Oil Modified Urethane Clear Satin
MPI 59	(Oct 2009) Interior/Exterior Floor Enamel, Low Gloss
MPI 6	(Oct 2009) Exterior Latex Wood Primer
MPI 60	(Oct 2009) Interior/Exterior Latex Floor Paint, Low Gloss
MPI 68	(Oct 2009) Interior/Exterior Latex Floor Enamel, Gloss
MPI 7	(Oct 2009) Exterior Oil Wood Primer
MPI 71	(Oct 2009) Polyurethane, Moisture Cured, Clear, Flat
MPI 72	(Oct 2009) Polyurethane, Two Component, Pigmented, Gloss
MPI 77	(Oct 2009) Epoxy Gloss
MPI 79	(Oct 2009) Alkyd Anti-Corrosive Metal Primer
MPI 8	(Oct 2009) Exterior Alkyd, Flat, MPI Gloss Level I
MPI 9	(Oct 2009) Exterior Alkyd, Gloss, MPI Gloss Level 6
MPI 90	(Oct 2009) Interior Wood Stain, Semi-Transparent
MPI 94	(Oct 2009) Exterior Alkyd, Semi-Gloss, MPI

Gloss Level 5

MPI 95 (Oct 2009) Quick Drying Primer for Aluminum

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC 7/NACE No.4 (2007; E 2004) Brush-Off Blast Cleaning

SSPC Guide 6 (2015) Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations

SSPC Guide 7 (2004; E 2004) Guide to the Disposal of Lead-Contaminated Surface Preparation Debris

SSPC PA 1 (2016) Shop, Field, and Maintenance Coating of Metals

SSPC PA Guide 3 (1982; E 1995) A Guide to Safety in Paint Application

SSPC Paint 18 (1982; E 2004) Chlorinated Rubber Intermediate Coat Paint

SSPC SP 1 (2015) Solvent Cleaning

SSPC SP 10/NACE No. 2 (2007) Near-White Blast Cleaning

SSPC SP 12/NACE No.5 (2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating

SSPC SP 2 (1982; E 2000; E 2004) Hand Tool Cleaning

SSPC SP 3 (1982; E 2004) Power Tool Cleaning

SSPC SP 6/NACE No.3 (2007) Commercial Blast Cleaning

SSPC VIS 1 (2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

SSPC VIS 3 (2004) Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning

SSPC VIS 4/NACE VIS 7 (1998; E 2000; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety and Health Requirements Manual

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-PRF-680 (2010; Rev C; Notice 1 2015) Degreasing Solvent

MIL-STD-101 (2014; Rev C) Color Code for Pipelines and  
for Compressed Gas Cylinders

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 24 (2000) Determination of Volatile Matter  
Content, Water Content, Density, Volume  
Solids, and Weight Solids of Surface  
Coatings

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1 (2015; Rev L) Obstruction Marking and  
Lighting

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313 (2014; Rev E) Material Safety Data,  
Transportation Data and Disposal Data for  
Hazardous Materials Furnished to  
Government Activities

FED-STD-595 (Rev C; Notice 1) Colors Used in  
Government Procurement

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000 Air Contaminants

29 CFR 1910.1001 Asbestos

29 CFR 1910.1025 Lead

29 CFR 1926.62 Lead

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

## SD-02 Shop Drawings

Submit color [stencil](#) codes

## SD-03 Product Data

[Certification](#)

[Coating; G\[, \[\\_\\_\\_\\_\\_\]\]](#)

[Manufacturer's Technical Data Sheets](#)

[\[Sealant\]](#)

## SD-04 Samples

[Color; G](#)

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

[  
]

## SD-07 Certificates

[Applicator's qualifications](#)

## SD-08 Manufacturer's Instructions

[Application instructions](#)

[Mixing](#)

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

[Manufacturer's Safety Data Sheets](#)

Submit manufacturer's Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in [FED-STD-313](#).

## SD-10 Operation and Maintenance Data

[Coatings; G\[, \[\\_\\_\\_\\_\\_\]\]](#)

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

### 1.3 APPLICATOR'S QUALIFICATIONS

#### [1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on [\_\_\_\_\_] on a minimum of three similar projects within the past three years. List information by individual and include the following:

- a. Name of individual and proposed position for this work.
- b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

]

#### [1.3.2 SSPC QP 1 Certification

Not applicable.

### ]1.4 QUALITY ASSURANCE

#### 1.4.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that conform to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

##### ]1.4.1.1 Sampling Procedure

Not applicable.

1.4.1.2 Testing Procedure

Not applicable.

1.4.2 Textured Wall Coating System

Not applicable.

1.4.3 Sample Textured Wall Coating System Mock-Up

Not applicable.

[1.4.4 Sustainable Design Certification

Not applicable.

]1.5 REGULATORY REQUIREMENTS

1.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.5.4 Asbestos Content

Materials shall not contain asbestos.

1.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.5.6 Silica

Abrasive blast media shall not contain free crystalline silica.

1.5.7 Human Carcinogens

Materials shall not contain ACGIH 0100 confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.6 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and

special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F.

#### 1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

##### 1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA Guide 3.

##### 1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

- a. The applicable manufacturer's Safety Data Sheets (SDS) or local regulation.
- b. 29 CFR 1910.1000.
- c. ACGIH 0100, threshold limit values.
- [d. The appropriate OSHA standard in 29 CFR 1910.1025 and 29 CFR 1926.62 for surface preparation on painted surfaces containing lead. Removal and disposal of coatings which contain lead is specified in Section 02 82 33.13 20 REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD." Additional guidance is given in SSPC Guide 6 and SSPC Guide 7. Refer to drawings for list of hazardous materials located on this project. Contractor to coordinate paint preparation activities with this specification section.
- ]
  - [ e. The appropriate OSHA standards in 29 CFR 1910.1001 for surface preparation of painted surfaces containing asbestos. Removal and disposal of coatings which contain asbestos materials is specified in [Section 02 82 16.00 20 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS][Section 02 82 13.00 10 ASBESTOS ABATEMENT]. Refer to drawings for list of hazardous materials located on this project. Contractor to coordinate paint preparation activities with this specification section.

#### 1.8 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation. [Isolate area of application from rest of building when applying high-emission paints or coatings.]

## 1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

- a. Less than 5 degrees F above dew point;
- b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

## 1.9 SUSTAINABLE DESIGN REQUIREMENTS

## 1.9.1 Local/Regional Materials

[ Use materials or products extracted, harvested, or recovered, as well as manufactured, within a [500][ ] mile radius from the project site, if available from a minimum of three sources.][See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Paint and coating materials may be locally available.

## ]1.10 COLOR SELECTION

[ Color Coding For Shore-To-Ship Utility Connections: Paint hose connection fittings and shut-off valves the designated color. In addition to color coding provide 2 inch high stenciled letters using black stencil paint, clearly designating service for each connection.

Color Coding for Shore-to-Ship  
Utility Connections

<u>Service</u>	<u>Color</u>	<u>FED-STD-595 No.</u>
Potable Water*	Blue	15044
Water Provided for Fire Protection**	Red	11105
Chilled Water	Striped Blue/White	15044/17886
Oily Waste Water	Striped Yellow/Black	13538/17038
Sewer	Gold	17043
Steam	White	17886
High Pressure Air	Gray	16081
Low Pressure Air	Tan	10324
Fuel	Yellow	13655

\* This includes connections serving domestic functions.

\*\* This includes non-potable salt water or, at some locations, fresh water connections provided for fire protection (may also include flushing and cooling requirements). Note: This does not include waterfront fire hydrants.

Color Coding for Shore-to-Ship  
Utility Connections

<u>Service</u>	<u>Color</u>	<u>FED-STD-595 No.</u>
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] Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Color, texture, and pattern of wall coating systems shall be [as indicated][in accordance with Section 09 06 00 SCHEDULES FOR FINISHES] [\_\_\_\_\_].

#### 1.11 LOCATION AND SURFACE TYPE TO BE PAINTED

##### 1.11.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

- a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
- b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
- c. Existing coated surfaces that are damaged during performance of the work.

##### 1.11.1.1 Exterior Painting

Includes new surfaces[, existing coated surfaces,] [and] [existing uncoated surfaces,] of the building[s] and appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

##### 1.11.1.2 Interior Painting

Includes new surfaces[, existing uncoated surfaces,] [and] [existing coated surfaces] of the building[s] and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

- a. Exposed columns, girders, beams, joists, and metal deck; and
- b. Other contiguous surfaces.

##### 1.11.2 Painting Excluded

Do not paint the following unless indicated otherwise.

- a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.
- b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.
- c. Steel to be embedded in concrete.
- d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.
- e. Hardware, fittings, and other factory finished items.
- [ f. Surfaces in the following areas shall not be painted:  
[\_\_\_\_\_].

#### ]1.11.3 Mechanical and Electrical Painting

Includes field coating of [interior] [and] [exterior] new [and existing] surfaces.

- a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.
  - (1) Exposed piping, conduit, and ductwork;
  - (2) Supports, hangers, air grilles, and registers;
  - (3) Miscellaneous metalwork and insulation coverings.
- [ b. Do not paint the following, unless indicated otherwise:
  - [ (1) New zinc-coated, aluminum, and copper surfaces under insulation
  - ][ (2) New aluminum jacket on piping
  - ][ (3) New interior ferrous piping under insulation.

#### ]][1.11.3.1 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

- a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material. [In lieu of red enamel finish coat, provide piping with 2 inch wide

red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals.]

- b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals throughout the piping systems.

#### ]1.11.4 Exterior Painting of Site Work Items

Field coat the following items:

New Surfaces	Existing Surfaces
a. [_____]	[_____]
b. [_____]	[_____]
c. [_____]	[_____]

#### ]1.11.5 MISCELLANEOUS PAINTING

Lettering [Building ][Room Number(s) ]

Lettering shall be provided as scheduled on the drawings, shall be [block] [Gothic] type, and shall be [black enamel] [water-type decalcomania, finished with a protective coating of spar varnish]. Samples shall be approved before application.

#### [ Obstructions To Aviation

The following obstructions to aviation shall be painted in the pattern and color prescribed by [FAA AC 70/7460-1] [\_\_\_\_\_]

#### ]1.11.6 Definitions and Abbreviations

##### 1.11.6.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

##### 1.11.6.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

##### 1.11.6.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller

coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

#### 1.11.6.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

#### 1.11.6.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

#### 1.11.6.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

#### 1.11.6.7 EXT

MPI short term designation for an exterior coating system.

#### 1.11.6.8 INT

MPI short term designation for an interior coating system.

#### 1.11.6.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

#### 1.11.6.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

#### 1.11.6.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

#### 1.11.6.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with [ASTM D523](#). Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

#### 1.11.6.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

#### 1.11.6.14 Paint

See Coating definition.

#### 1.11.6.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

#### 1.11.6.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

Conform to the [coating](#) specifications and standards referenced in PART 3. Submit [manufacturer's technical data sheets](#) for specified [coatings](#) and solvents. [Minimum [20][50][\_\_\_\_\_] percent post-consumer recycled content for the following light-colored paints and primers: [\_\_\_\_\_] Minimum [50][90][99][\_\_\_\_\_] percent post-consumer recycled content for the following dark-colored paints and primers: [\_\_\_\_\_] [All][The following] consolidated latex paints shall contain a minimum of [100][\_\_\_\_\_] percent post-consumer recycled content[: [\_\_\_\_\_]].] Comply with applicable regulations regarding toxic and hazardous materials.

### PART 3 EXECUTION

#### 3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

### [3.2 REPUTTYING AND REGLAZING

Remove cracked, loose, and defective putty or glazing compound on glazed sash and provide new putty or glazing compound. Where defective putty or glazing compound constitutes 30 percent or more of the putty at any one light, remove the glass and putty or glazing compound and reset the glass. Remove putty or glazing compound without damaging sash or glass. Clean rabbets to bare wood or metal and prime prior to reglazing. Putty for wood sash shall be a linseed oil putty. Patch surfaces to provide smooth transition between existing and new surfaces. Finish putty or glazing compound to a neat and true bead. Allow glazing compound time to cure, in accordance with manufacturer's recommendation, prior to coating application. Allow putty to set one week prior to coating application.

### ] [3.3 RESEALING OF EXISTING EXTERIOR JOINTS

#### 3.3.1 Surface Condition

Surfaces shall be clean, dry to the touch, and free from frost and moisture; remove grease, oil, wax, lacquer, paint, defective backstop, or other foreign matter that would prevent or impair adhesion. Where adequate grooves have not been provided, clean out to a depth of  $\frac{1}{2}$  inch and grind to a minimum width of  $\frac{1}{4}$  inch without damage to adjoining work. Grinding shall not be required on metal surfaces.

#### 3.3.2 Backstops

In joints more than  $\frac{1}{2}$  inch deep, install glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free of oil or other staining elements as recommended by sealant manufacturer. Backstop material shall be compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

#### 3.3.3 Primer and Bond Breaker

Install the type recommended by the sealant manufacturer.

#### 3.3.4 Ambient Temperature

Between 38 degrees F and 95 degrees F when applying sealant.

#### 3.3.5 Exterior Sealant

For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T. Color(s) shall be selected by the Contracting Officer. Apply the sealant in accordance with the manufacturer's printed instructions. Force sealant into joints with sufficient pressure to fill the joints solidly. Sealant shall be uniformly smooth and free of wrinkles.

#### 3.3.6 Cleaning

Immediately remove fresh sealant from adjacent areas using a solvent recommended by the sealant manufacturer. Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean condition. Allow sealant time to cure, in accordance with manufacturer's recommendations, prior to coating.

### ]3.4 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, [disintegrated coatings,] and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

#### [3.4.1 Additional Requirements for Preparation of Surfaces With Existing Coatings

Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

- a. Test existing finishes for lead before sanding, scraping, or removing. If lead is present, refer to paragraph Toxic Materials.
- b. Wipe previously painted surfaces to receive solvent-based coatings, except stucco and similarly rough surfaces clean with a clean, dry cloth saturated with mineral spirits, [ASTM D235](#). Allow surface to dry. Wiping shall immediately precede the application of the first coat of any coating, unless specified otherwise.
- c. Sand existing glossy surfaces to be painted to reduce gloss. Brush, and wipe clean with a damp cloth to remove dust.
- d. The requirements specified are minimum. Comply also with the [application instructions](#) of the paint manufacturer.
- e. Previously painted surfaces [specified to be repainted] [damaged during construction] shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.
- f. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed.
- g. Chalk shall be removed so that when tested in accordance with [ASTM D4214](#), the chalk resistance rating is no less than 8.
- h. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas.
- i. Edges of chipped paint shall be feather edged and sanded smooth.
- j. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting.
- k. New, proposed coatings shall be compatible with existing coatings.

## ][3.4.2 Existing Coated Surfaces with Minor Defects

[Sand, spackle, and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligatoring, chalking, and irregularities due to partial peeling of previous coatings.] [Remove chalking by sanding [or blasting] so that when tested in accordance with ASTM D4214, the chalk rating is not less than 8.]

## ][3.4.3 Removal of Existing Coatings

Remove existing coatings from the following surfaces:

- a. Surfaces containing large areas of minor defects;
- b. Surfaces containing more than 20 percent peeling area; and
- c. Surfaces designated by the Contracting Officer, such as surfaces where rust shows through existing coatings.

## ][3.4.4 Substrate Repair

- a. Repair substrate surface damaged during coating removal;
- b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and
- c. Clean and prime the substrate as specified.

## ][3.5 PREPARATION OF METAL SURFACES

## 3.5.1 Existing and New Ferrous Surfaces

- a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: [Solvent clean] [or] [detergent wash] in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to [SSPC SP 2], [SSPC SP 3], [SSPC SP 6/NACE No.3], or [SSPC SP 10/NACE No. 2]. [Brush-off blast remaining surface in accordance with SSPC SP 7/NACE No.4]; [Water jetting to SSPC SP 12/NACE No.5 WJ-4 may be used to remove loose coating and other loose materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting.] Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.
- b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with [SSPC SP 6/NACE No.3/SSPC SP 12/NACE No.5 WJ-3][SSPC SP 10/NACE No. 2/SSPC SP 12/NACE No.5 WJ-2].
- [ c. Metal Floor Surfaces to Receive Nonslip Coating: Clean in accordance with [SSPC SP 10/NACE No. 2][SSPC SP 12/NACE No.5 WJ-2].

## ][3.5.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to

photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC 7/NACE No.4, SSPC SP 6/NACE No.3, and SSPC SP 10/NACE No. 2. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12/NACE No.5. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 4/NACE VIS 7.

### 3.5.3 Galvanized Surfaces

- a. New or Existing Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with [solvent, ][steam, ][or ][non-alkaline detergent solution ]in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D6386, Appendix X2, and remove by one of the methods described therein.
- b. Galvanized with Slight Coating Deterioration or with Little or No Rusting: Water jetting to SSPC SP 12/NACE No.5 WJ3 to remove loose coating from surfaces with less than 20 percent coating deterioration and no blistering, peeling, or cracking. Use inhibitor as recommended by the coating manufacturer to prevent rusting.
- c. Galvanized With Severe Deteriorated Coating or Severe Rusting: [Water jet to SSPC SP 12/NACE No.5 WJ3 degree of cleanliness.] [Spot abrasive blast rusted areas as described for steel in SSPC SP 6/NACE No.3, and waterjet to SSPC SP 12/NACE No.5, WJ3 to remove existing coating.]

### 3.5.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

### 3.5.5 Terne-Coated Metal Surfaces

Solvent clean surfaces with mineral spirits, ASTM D235. Wipe dry with clean, dry cloths.

### 3.5.6 Existing Surfaces with a Bituminous or Mastic-Type Coating

Remove chalk, mildew, and other loose material by washing with a solution of 1/2 cup trisodium phosphate, 1/4 cup household detergent, one quart 5 percent sodium hypochlorite solution and 3 quarts of warm water.

## 3.6 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

### 3.6.1 Concrete and Masonry

- a. Curing: Concrete, stucco and masonry surfaces shall be allowed to

cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, [Chalking,] Grease, and Oil: Wash new [and existing uncoated] surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water. [Wash existing coated surfaces with a suitable detergent and rinse thoroughly.] For large areas, water blasting may be used.

(2) Fungus and Mold: Wash [new] [, existing coated,] [and existing uncoated] surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

(3) Paint and Loose Particles: Remove by wire brushing.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

[ (5) Removal of Existing Coatings: For surfaces to receive textured coating MPI 42, remove existing coatings including soundly adhered coatings if recommended by textured coating manufacturer.

] c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

### 3.6.2 Gypsum Board, Plaster, and Stucco

a. Surface Cleaning: Plaster and stucco shall be clean and free from loose matter; gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.

b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.

c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D4263. New plaster to be coated shall have a maximum moisture content of 8 percent, when

measured in accordance with ASTM D4444, Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.

### 3.6.3 Existing Asbestos Cement Surfaces

Remove oily stains by solvent cleaning with mineral spirits, [MIL-PRF-680][ASTM D235]. Remove loose dirt, dust, and other deleterious substances by brushing with a soft brush or rubbing with a dry cloth prior to application of the first coat material. Do not wire brush or clean using other abrasive methods. Surfaces shall be dry and clean prior to application of the coating.

## 3.7 PREPARATION OF WOOD AND PLYWOOD SURFACES

### 3.7.1 New [, Existing Uncoated,] [and] [Existing Coated] Plywood and Wood Surfaces, Except Floors:

- a. Wood surfaces shall be cleaned of foreign matter.

Surface Cleaning: Surfaces shall be free from dust and other deleterious substances and in a condition approved by the Contracting Officer prior to receiving paint or other finish. Do not use water to clean uncoated wood. [Scrape to remove loose coatings. Lightly sand to roughen the entire area of previously enamel-coated wood surfaces.]

- [ b. Removal of Fungus and Mold: Wash existing coated surfaces with a solution composed of 3 ounces (2/3 cup) trisodium phosphate, 1 ounce (1/3 cup) household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.
- ] c. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter in accordance with ASTM D4444, Method A, unless otherwise authorized.
- d. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints.
- e. Cracks and Nailheads: Set and putty stop nailheads and putty cracks after the prime coat has dried.
- f. Cosmetic Repair of Minor Defects:
  - (1) Knots and Resinous Wood [and Fire, Smoke, Water, and Color Marker Stained Existing Coated Surface]: Prior to application of coating, cover knots and stains with two or more coats of 3-pound-cut shellac varnish, plasticized with 5 ounces of castor oil per gallon. Scrape away existing coatings from knotty areas, and sand before treating. Prime before applying any putty over shellacked area.
  - (2) Open Joints and Other Openings: Fill with whiting putty, linseed oil putty. Sand smooth after putty has dried.
  - (3) Checking: Where checking of the wood is present, sand the surface, wipe and apply a coat of pigmented orange shellac. Allow to dry before paint is applied.

- g. Prime Coat For New Exterior Surfaces: Prime coat [wood doors,] [windows,] [frames,] [and] [trim] before wood becomes dirty, warped, [or weathered].

### 3.7.2 Wood Floor Surfaces, Natural Finish

- a. Initial Surface Cleaning: As specified in paragraph entitled "Surface Preparation."
- [ b. Existing Loose Boards and Shoe Molding: Before sanding, renail loose boards. Countersink nails and fill with an approved wood filler. Remove shoe molding before sanding and reinstall after completing other work. At Contractor's option, new shoe molding may be provided in lieu of reinstalling old. New wood molding shall be same size, wood species, and finish as the existing.
- ] c. Sanding and Scraping: Sanding of wood floors is specified in Section [ 09 64 29 WOOD STRIP AND PLANK FLOORING] [09 64 23 WOOD PARQUET FLOORING] [09 64 66 WOOD ATHLETIC FLOORING] [09 64 00 PORTABLE (DEMOUNTABLE) WOOD FLOORING]. Floors of oak or similar open-grain wood shall be filled with wood filler recommended by the finish manufacturer and the excess filler removed.
- d. Final Cleaning: After sanding, sweep and vacuum floors clean. Do not walk on floors thereafter until specified sealer has been applied and is dry.

### 3.7.3 Interior Wood Surfaces, Stain Finish

Interior wood surfaces to receive stain shall be sanded. Oak and other open-grain wood to receive stain shall be given a coat of wood filler not less than 8 hours before the application of stain; excess filler shall be removed and the surface sanded smooth.

### 3.7.4 Water Blasting of Existing Coated Wood Surfaces:

Water blasting shall be provided for the following surfaces: [\_\_\_\_\_].

- a. Sample Panel: Prior to the initial surface cleaning, water blast a representative surface designated by the Contracting Officer. Final surface condition of remaining work shall be similar to sample panel approved by the Contracting Officer.
- b. Initial Surface Cleaning: Water blasting shall consist of washing surfaces to receive paint with a high pressure spray, to remove loose paint, dirt, and other foreign or deleterious materials. The working pressure shall be between 400 and 700 pounds per square inch gage (psig) at a nozzle operating rate of a minimum 20 gallons per minute (g/min.). Do not flood vents or damage windows and floors. If the pressure specified will cause damage to existing wood, advise the Contracting Officer and obtain permission to vary the pressure. Direct the wash nozzle at the surface at an angle of approximately 75 degrees with the surface and at a distance not greater than 5 feet to apply water pressure required to remove loose paint, dirt, chalking, and other foreign matter.
- c. Final Surface Cleaning: After allowing the surfaces to dry for a minimum of 24 hours, remove remaining dirt, splinters, loose particles, disintegrated and loose paint, grease, oil, and other

foreign matter from the surface.

### 3.8 APPLICATION

#### 3.8.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with **SSPC PA 1**. **SSPC PA 1** methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats.[ Interior areas shall be broom clean and dust free before and during the application of coating material.]

[ Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of **1.0 mil**. Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

- ] a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.
- b. Primers, and Intermediate Coats: Do not allow primers or intermediate

coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

- c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.
- d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.
- e. Floors: [For nonslip surfacing on level floors, as the intermediate coat is applied, cover wet surface completely with almandite garnet, Grit No. 36, with maximum passing U.S. Standard Sieve No. 40 less than 0.5 percent. When the coating is dry, use a soft bristle broom to sweep up excess grit, which may be reused, and vacuum up remaining residue before application of the topcoat.] [For nonslip surfacing on ramps, provide MPI 77 with non-skid additive, applied by roller in accordance with manufacturer's instructions.]

### 3.8.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than [0.125 L] [1 pint] of suitable thinner per [liter.] [gallon.] The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

### 3.8.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

### 3.8.4 Coating Systems

- a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

#### Table

Division 3.	Exterior Concrete Paint Table
Division 4.	Exterior Concrete Masonry Units Paint Table
Division 5.	Exterior Metal, Ferrous and Non-Ferrous Paint Table
Division 6.	Exterior Wood; Dressed Lumber, Paneling, Decking, Shingles Paint Table
Division 9:	Exterior Stucco Paint Table

TableDivision 10. Exterior Cloth Coverings and Bituminous Coated  
Surfaces Paint Table

Division 3. Interior Concrete Paint Table

Division 4. Interior Concrete Masonry Units Paint Table

Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table

Division 6. Interior Wood Paint Table

Division 9: Interior Plaster, Gypsum Board, Textured Surfaces  
Paint Table

- b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.
- c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.
- d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:
  - (1) One coat of primer.
  - (2) One coat of undercoat or intermediate coat.
  - (3) One topcoat to match adjacent surfaces.
- e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

## 3.9 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

- a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.
- b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.
- c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
- d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.
- e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

- f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

### 3.10 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

### 3.11 COATING SYSTEMS FOR WOOD AND PLYWOOD

- a. Apply coatings of Tables in Division 6 for Exterior and Interior.
- b. Prior to erection, apply two coats of specified primer to treat and prime wood [and plywood] surfaces which will be inaccessible after erection.
- c. Apply stains in accordance with manufacturer's printed instructions.
- [ d. Wood Floors to Receive Natural Finish: Thin first coat 2 to 1 using thinner recommended by coating manufacturer. Apply all coatings at rate of 300 to 350 square feet per gallon. Apply second coat not less than 2 hours and not over 24 hours after first coat has been applied. Apply with lambs wool applicators or roller as recommended by coating manufacturer. Buff or lightly sand between intermediate coats as recommended by coating manufacturer's printed instructions.

### ]3.12 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with [MIL-STD-101][ASME A13.1]. Place stenciling in clearly visible locations. On piping not covered by [MIL-STD-101][ASME A13.1], stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

### 3.13 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

### 3.14 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers. [Coordinate with manufacturer for take-back program. Set aside scrap to be returned to manufacturer for recycling into new product. When such a service is not available, local recyclers shall be sought after to reclaim the materials.] [Set aside extra paint for future color matches or reuse by the Government.] [Where local options exist for leftover paint recycling, collect all waste paint by

type and provide for delivery to recycling or collection facility for reuse by local organizations.]

### 3.15 PAINT TABLES

All DFT's are minimum values.[ Use only materials [with a GPS green check mark] having a minimum MPI "Environmentally Friendly" [E1] [E2] [E3] rating based on VOC (EPA Method 24) content levels.][ Use only interior paints and coatings that meet VOC requirements of LEED low emitting materials credit.] Acceptable products are listed in the MPI Green Approved Products List, available at <http://www.specifygreen.com/APL/ProductIdxByMPInum.asp>.

#### 3.15.1 EXTERIOR PAINT TABLES

##### DIVISION 3: EXTERIOR CONCRETE PAINT TABLE

- A. [New and uncoated existing] [and Existing, previously painted] concrete; vertical surfaces, including undersides of balconies and soffits but excluding tops of slabs:

##### 1. [Latex

[New; MPI EXT 3.1A-G2 (Flat) / Existing; MPI REX 3.1A-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 10 MPI 10 MPI 10

System DFT: 3.5 mils]

[New; MPI EXT 3.1A-G5 (Semigloss) / Existing; MPI EXT 3.1A-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 11 MPI 11 MPI 11

System DFT: 3.5 mils]

[New; MPI EXT 3.1A-G6 (Gloss) / Existing; MPI REX 3.1A-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 119 MPI 119 MPI 119

System DFT: 3.5 mils]

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces.]

- B. [New and uncoated existing] [and Existing, previously painted] concrete, textured system; vertical surfaces, including undersides of balconies and soffits but excluding tops of slabs:

##### 1. [Latex Aggregate

[New; MPI EXT 3.1B-G2 (Flat) / Existing; MPI REX 3.1B-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 42 MPI 10 MPI 10

System DFT: Per Manufacturer]

[New; MPI EXT 3.1B-G5 (Semigloss) / Existing; MPI REX 3.1B-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 42 MPI 11 MPI 11

System DFT: Per Manufacturer]

[New; MPI EXT 3.1B-G6 (Gloss) / Existing; MPI REX 3.1B-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 42 MPI 119 MPI 119

System DFT: Per Manufacturer]

## DIVISION 3: EXTERIOR CONCRETE PAINT TABLE

Texture - [Fine] [Medium] [Coarse]. Surface preparation and number of coats in accordance with manufacturer's instructions. Topcoat: Coating to match adjacent surfaces.]

- C. [New and uncoated existing] [and Existing, previously painted] concrete, elastomeric System; vertical surfaces, including undersides of balconies and soffits but excluding tops of slabs:

## 1. [Elastomeric Coating

New; MPI EXT 3.1F / Existing; MPI REX 3.1F

Primer: Intermediate: Topcoat:

Per Manufacturer MPI 113 MPI 113

System DFT: 16 mils

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation and number of coats in accordance with manufacturer's instructions.

NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film thickness of 16 mils.]

- D. [New and uncoated existing] [and Existing, previously painted] concrete: walls and bottom of swimming pools.

## 1. [Chlorinated Rubber

New; / Existing;

Primer: Intermediate: Topcoat:

SSPC Paint 18 SSPC Paint 18 SSPC Paint 18

System DFT: Per Manufacturer

NOTE: Thin first coat (primer) with 1 part of approved thinner to 4 parts of paint by volume.]

- E. [New] [and Existing] Cementitious composition board (including Asbestos cement board):

## 1. [Latex

[New; MPI EXT 3.3A-G1 (Flat) /Existing; MPI REX 3.3A-G1 (Flat)

Primer: Intermediate: Topcoat:

MPI 10 MPI 10 MPI 10

System DFT: 4.5 mils]

[New; MPI EXT 3.3A-G5 (Semigloss) / Existing; MPI REX 3.3A-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 11 MPI 11 MPI 11

System DFT: 4.5 mils]

[New; MPI EXT 3.3A-G6 (Gloss) / Existing; MPI REX 3.3A-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 119 MPI 119 MPI 119

System DFT: 4.5 mils]

Topcoat: Coating to match adjacent surfaces.]

## DIVISION 4: EXTERIOR CONCRETE MASONRY UNITS PAINT TABLE

## A. [New] [and Existing] concrete masonry on uncoated surface:

## 1. [Latex

[New; MPI EXT 4.2A-G1 (Flat) / Existing; MPI REX 4.2A-G1 (Flat)

Block Filler: Primer: Intermediate: Topcoat:

MPI 4 N/A

MPI 10

MPI 10

System DFT: 11 mils]

[New; MPI EXT 4.2A-G5 (Semigloss) / Existing; MPI REX 4.2A-G5 (Semigloss)

Block Filler: Primer: Intermediate: Topcoat:

MPI 4 N/A

MPI 11

MPI 11

System DFT: 11 mils]

[New; MPI EXT 4.2A-G6 (Gloss) / Existing; MPI REX 4.2A-G6 (Gloss)

Block Filler: Primer: Intermediate: Topcoat:

MPI 4 N/A

MPI 119

MPI 119

System DFT: 11 mils]

Topcoat: Coating to match adjacent surfaces.]

## B. [New] [and Existing] concrete masonry, textured system; on uncoated surface:

## 1. [Latex Aggregate

[New; MPI EXT 4.2B-G1 (Flat) / Existing; MPI REX 4.2B-G1 (Flat)

Primer: Intermediate: Topcoat:

MPI 42

MPI 42

MPI 10

System DFT: Per Manufacturer]

[New; MPI EXT 4.2B-G5 (Semigloss) / Existing; MPI REX 4.2B-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 42

MPI 42

MPI 11

System DFT: Per Manufacturer]

[New; MPI EXT 4.2B-G6 (Gloss) / Existing; MPI REX 4.2B-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 42

MPI 42

MPI 119

System DFT: Per Manufacturer]

Texture - [Fine] [Medium] [Coarse]. Surface preparation and number of coats in accordance with manufacturer's instructions. Topcoat: Coating to match adjacent surfaces.]

## C. [New] [and Existing] concrete masonry, elastomeric system; on uncoated surface:

## 1. [Elastomeric Coating

New; MPI EXT 4.2D / Existing; MPI REX 4.2D

Primer: Intermediate: Topcoat:

Per Manufacturer MPI 113

MPI 113

System DFT: 16 mils

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation and number of coats in accordance with manufacturer's instructions.

NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film

DIVISION 4: EXTERIOR CONCRETE MASONRY UNITS PAINT TABLE  
thickness of 16 mils.]

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE  
STEEL / FERROUS SURFACES

A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

1. [Alkyd  
[New; MPI EXT 5.1Q-G5 (Semigloss) Existing; MPI REX 5.1D-G5  
Primer: Intermediate: Topcoat:  
MPI 23 MPI 94 MPI 94  
System DFT: 5.25 mils]

[New; MPI EXT 5.1Q-G6 (Gloss) / Existing; MPI REX 5.1D-G6  
Primer: Intermediate: Topcoat:  
MPI 23 MPI 9 MPI 9  
System DFT: 5.25 mils]]

B. New Steel that has been blast-cleaned to SSPC SP 6/NACE No.3:

2. [Alkyd  
[New; MPI EXT 5.1D-G5 (Semigloss) / Existing; MPI REX 5.1D-G5  
Primer: Intermediate: Topcoat:  
MPI 79 MPI 94 MPI 94  
System DFT: 5.25 mils]

[New; MPI EXT 5.1D-G6 (Gloss) / Existing; MPI REX 5.1D-G6  
Primer: Intermediate: Topcoat:  
MPI 79 MPI 9 MPI 9  
System DFT: 5.25 mils]]

C. Existing steel that has been spot-blasted to SSPC SP 6/NACE No.3:

1. [Surface previously coated with alkyd or latex:

[Waterborne Light Industrial Coating  
MPI REX 5.1C-G5 (Semigloss)  
Spot Primer: Intermediate: Topcoat:  
MPI 79 MPI 163 MPI 163  
System DFT: 5 mils]

[MPI REX 5.1C-G6 (Gloss)  
Spot Primer: Intermediate: Topcoat:  
MPI 79 MPI 164 MPI 164  
System DFT: 5 mils]]

2. [Surface previously coated with epoxy:

[Waterborne Light Industrial  
a. MPI REX 5.1L-G5 (Semigloss)  
Spot Primer: Intermediate: Topcoat:  
MPI 101 MPI 163 MPI 163  
System DFT: 5 mils]

[MPI REX 5.1L-G6 (Gloss)

## STEEL / FERROUS SURFACES

Spot Primer: Intermediate: Topcoat:  
 MPI 101 MPI 164 MPI 164  
 System DFT: 5 mils]

[Pigmented Polyurethane

b. MPI REX 5.1H-G6 (Gloss)

Spot Primer: Intermediate: Topcoat:  
 MPI 101 MPI 108 MPI 72  
 System DFT: 8.5 mils]]

## D. New [and existing] steel blast cleaned to SSPC SP 10/NACE No. 2:

## 1. [Waterborne Light Industrial

[MPI EXT 5.1R-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
 MPI 101 MPI 108 MPI 163  
 System DFT: 8.5 mils]

[MPI EXT 5.1R-G6 (Gloss)

Primer: Intermediate: Topcoat:  
 MPI 101 MPI 108 MPI 164  
 System DFT: 8.5 mils]]

## 2. [Pigmented Polyurethane

MPI EXT 5.1J-G6 (Gloss)

Primer: Intermediate: Topcoat:  
 MPI 101 MPI 108 MPI 72  
 System DFT: 8.5 mils]

## E. Metal floors (non-shop-primed surfaces or non-slip deck surfaces) with non-skid additive (NSA), load at manufacturer's recommendations.:

## 1. [Alkyd Floor Enamel

MPI EXT 5.1S-G6 (Gloss)

Primer: Intermediate: Topcoat:  
 MPI 79 MPI 27 MPI 27 (plus NSA)  
 System DFT: 5.25 mils]

## EXTERIOR GALVANIZED SURFACES

## F. New Galvanized surfaces:

## 1. [Cementitious primer / Latex

[MPI EXT 5.3A-G1 (Flat)

Primer: Intermediate: Topcoat:  
 MPI 26 MPI 10 MPI 10  
 System DFT: 4.5 mils]

[MPI EXT 5.3A-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
 MPI 26 MPI 11 MPI 11  
 System DFT: 4.5 mils]

[MPI EXT 5.3A-G6 (Gloss)

Primer: Intermediate: Topcoat:  
 MPI 26 MPI 119 MPI 119  
 System DFT: 4.5 mils]]

## EXTERIOR GALVANIZED SURFACES

## 2. [Waterborne Primer / Latex

[MPI EXT 5.3H-G1 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 10	MPI 10
System DFT: 4.5 mils]		

[MPI EXT 5.3H-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 11	MPI 11
System DFT: 4.5 mils]		

[MPI EXT 5.3H-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 119	MPI 119
System DFT: 4.5 mils]]		

## 3. [Waterborne Primer / Waterborne Light Industrial Coating

[MPI EXT 5.3J-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 163	MPI 163
System DFT: 4.5 mils]		

[MPI EXT 5.3J-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 164	MPI 164
System DFT: 4.5 mils]]		

## 4. [Epoxy Primer / Waterborne Light Industrial Coating

[MPI EXT 5.3K-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 101	MPI 163	MPI 163
System DFT: 5 mils]		

[MPI EXT 5.3K-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 101	MPI 164	MPI 164
System DFT: 5 mils]]		

## 5. [Pigmented Polyurethane

MPI EXT 5.3L-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 101	N/A	MPI 72
System DFT: 5 mils]		

## G. Galvanized surfaces with slight coating deterioration; little or no rusting:

## 1. [Waterborne Light Industrial Coating

MPI REX 5.3J-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 134	N/A	MPI 163
System DFT: 4.5 mils]		

## 2. [Pigmented Polyurethane

MPI REX 5.3D-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 101	N/A	MPI 72
System DFT: 5 mils]		

## EXTERIOR GALVANIZED SURFACES

## H. Galvanized surfaces with severely deteriorated coating or rusting:

1. [Waterborne Light Industrial Coating  
[MPI REX 5.3L-G5(Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 101 MPI 108 MPI 163  
System DFT: 8.5 mils]  
  
[MPI REX 5.3L-G6(Gloss)  
Primer: Intermediate: Topcoat:  
MPI 101 MPI 108 MPI 164  
System DFT: 8.5 mils]]
2. [Pigmented Polyurethane  
MPI REX 5.3K-G6(Gloss)  
Primer: Intermediate: Topcoat:  
MPI 101 MPI 108 MPI 72  
System DFT: 5 mils]

## EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

## I. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, roof surfaces, and new prefinished equipment. Match surrounding finish:

1. [Alkyd  
[MPI EXT 5.4F-G1 (Flat)  
Primer: Intermediate: Topcoat:  
MPI 95 MPI 8 MPI 8  
System DFT: 5 mils]  
  
[MPI EXT 5.4F-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 95 MPI 94 MPI 94  
System DFT: 5 mils]  
  
[MPI EXT 5.4F-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 95 MPI 9 MPI 9  
System DFT: 5 mils]]
2. [Waterborne Light Industrial Coating  
[MPI EXT 5.4G-G3(Eggshell)  
Primer: Intermediate: Topcoat:  
MPI 95 MPI 161 MPI 161  
System DFT: 5 mils]  
  
[MPI EXT 5.4G-G5(Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 95 MPI 163 MPI 163  
System DFT: 5 mils]  
  
[MPI EXT 5.4G-G6(Gloss)  
Primer: Intermediate: Topcoat:  
MPI 95 MPI 164 MPI 164  
System DFT: 5 mils]]

## EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

## I. Existing roof surfaces previously coated:

1. [Aluminum Pigmented Asphalt Roof Coating  
ASTM D2824/D2824M: Sufficient coats to provide not less than 8 mils  
of finished coating system (without asbestos fibers).]
2. [Aluminum Paint  
MPI REX 10.2D  
Primer: Intermediate: Topcoat:  
MPI 107 MPI 1 MPI 1  
System DFT: 3.5 mils]

## J. Surfaces adjacent to painted surfaces; [Mechanical,] [Electrical,] [Fire extinguishing sprinkler systems including valves, conduit, hangers, supports,][exposed copper piping,] [and miscellaneous metal items] not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

1. [Alkyd  
[MPI EXT 5.1D-G1 (Flat)  
Primer: Intermediate: Topcoat:  
MPI 79 MPI 8 MPI 8  
System DFT: 5.25 mils]  
  
[MPI EXT 5.1D-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 79 MPI 94 MPI 94  
System DFT: 5.25 mils]  
  
[MPI EXT 5.1D-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 79 MPI 9 MPI 9  
System DFT: 5.25 mils]]
2. [Waterborne Light Industrial Coating  
[MPI EXT 5.1C-G3(Eggshell)  
Primer: Intermediate: Topcoat:  
MPI 79 MPI 161 MPI 161  
System DFT: 5 mils]  
  
[MPI EXT 5.1C-G5(Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 79 MPI 163 MPI 163  
System DFT: 5 mils]  
  
[MPI EXT 5.1C-G6(Gloss)  
Primer: Intermediate: Topcoat:  
MPI 79 MPI 164 MPI 164  
System DFT: 5 mils]]

## K. Hot metal surfaces [including smokestacks] subject to temperatures up to 400 degrees F:

1. [Heat Resistant Enamel  
MPI EXT 5.2A  
Primer: Intermediate: Topcoat:  
MPI 21 Surface preparation and number of coats per  
manufacturer's instructions.

## EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

System DFT: Per Manufacturer]

## L. Ferrous metal subject to high temperature, up to 750 degrees F:

## 1. [Inorganic Zinc Rich Coating

MPI EXT 5.2C

Primer: Intermediate: Topcoat:  
 MPI 19 Surface preparation and number of coats per  
 manufacturer's instructions.  
 System DFT: Per Manufacturer]

## 2. [Heat Resistant Aluminum Enamel

MPI EXT 5.2B (Aluminum Finish)

Primer: Intermediate: Topcoat:  
 MPI 2 Surface preparation and number of coats per  
 manufacturer's instructions.  
 System DFT: Per Manufacturer]

## M. [New surfaces and] [Existing surfaces] made bare cleaning to SSPC SP 10/NACE No. 2

subject to temperatures up to 593 degrees C (1100 degrees F):

## 1. [Heat Resistant Coating

MPI EXT 5.2D

Primer: Intermediate: Topcoat:  
 MPI 22 Surface preparation and number of coats per  
 manufacturer's instructions.  
 System DFT: Per Manufacturer]

DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES  
PAINT TABLEA. New [and Existing, uncoated] Dressed lumber, Wood and plywood, trim,  
[including top, bottom and edges of doors] not otherwise specified:

## 1. [Alkyd

[MPI EXT 6.3B-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
 MPI 7 MPI 94 MPI 94  
 System DFT: 5 mils]

[MPI EXT 6.3B-G6 (Gloss)

Primer: Intermediate: Topcoat:  
 MPI 7 MPI 9 MPI 9  
 System DFT: 5 mils]]

## 2. [Latex

[MPI EXT 6.3A-G1 (Flat)

Primer: Intermediate: Topcoat:  
 MPI 7 MPI 10 MPI 10  
 System DFT: 5 mils]

[MPI EXT 6.3A-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
 MPI 7 MPI 11 MPI 11  
 System DFT: 5 mils]

DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES  
PAINT TABLE

[MPI EXT 6.3A-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 MPI 7 MPI 119 MPI 119  
 System DFT: 5 mils]]

## 3. [Waterborne Solid Color Stain

MPI EXT 6.3K  
 Primer: Intermediate: Topcoat:  
 MPI 7 MPI 16 MPI 16  
 System DFT: 4.25 mils]

## B. Existing, dressed lumber, Wood and plywood, trim, [including top, bottom and edges of doors] previously coated with an alkyd / oil based finish coat not otherwise specified:

## 1. [Alkyd

[MPI REX 6.3B-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 94 MPI 94  
 System DFT: 5 mils]

[MPI REX 6.3B-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 9 MPI 9  
 System DFT: 5 mils]]

## 2. [Latex

[MPI REX 6.3A-G1 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 10 MPI 10  
 System DFT: 5 mils]

[MPI REX 6.3A-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 11 MPI 11  
 System DFT: 5 mils]

[MPI REX 6.3A-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 119 MPI 119  
 System DFT: 5 mils]]

## C. Existing, dressed lumber, Wood and plywood, trim, [including top, bottom and edges of doors] previously coated with a latex / waterborne finish coat not otherwise specified:

## 1. [Latex

[MPI REX 6.3L-G1 (Flat)  
 Spot Primer: Intermediate: Topcoat:  
 MPI 6 MPI 10 MPI 10  
 System DFT: 4.5 mils]

[MPI REX 6.3L-G5 (Semigloss)  
 Spot Primer: Intermediate: Topcoat:  
 MPI 6 MPI 11 MPI 11  
 System DFT: 4.5 mils]

DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES  
PAINT TABLE

[MPI REX 6.3L-G6 (Gloss)  
 Spot Primer: Intermediate: Topcoat:  
 MPI 6 MPI 119 MPI 119  
 System DFT: 4.5 mils]]

2. [Waterborne Solid Color Stain  
 MPI REX 6.3K (Stain)  
 Spot Primer: Intermediate: Topcoat:  
 MPI 6 MPI 16 MPI 16  
 System DFT: 4 mils]

## D. New, Uncoated wood siding:

1. [Semi-Transparent Stain  
 MPI EXT 6.3D  
 Spot Primer: Intermediate: Topcoat:  
 N/A MPI 13 MPI 13  
 System DFT: N/A]

## E. Existing, previously stained wood siding:

1. [Latex  
 [MPI REX 6.2K-G1 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 10 MPI 10  
 System DFT: 4.5 mils]

[MPI REX 6.2K-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 11 MPI 11  
 System DFT: 4.5 mils]]

## F. Existing Uncoated or previously semitransparent stained wood siding:

1. [Semi-Transparent Stain  
 MPI REX 6.3D  
 Spot Primer: Intermediate: Topcoat:  
 N/A MPI 13 MPI 13  
 System DFT: Per Manufacturer]

## G. Wood: [Steps], [platforms], [floors of open porches], and [\_\_\_\_\_] [with non-skid additive (NSA), load at manufacturer's recommendations.]

1. [Latex Floor Paint  
 [MPI EXT 6.5A-G2 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 60 [plus NSA] MPI 60 [plus NSA]  
 System DFT: 4.5 mils]

[MPI EXT 6.5A-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 MPI 5 MPI 68 [plus NSA] MPI 68 [plus NSA]  
 System DFT: 4.5 mils]]

2. [Alkyd Floor Paint  
 [MPI EXT 6.5B-G2 (Flat)  
 Primer: Intermediate: Topcoat:

DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES  
PAINT TABLE

MPI 59	MPI 59 [plus NSA]	MPI 59 [plus NSA]
System DFT:	5 mils]	
[MPI EXT 6.5B-G6 (Gloss)		
Primer:	Intermediate:	Topcoat:
MPI 27	MPI 27 [plus NSA]	MPI 27 [plus NSA]
System DFT:	5 mils]]	

## DIVISION 9: EXTERIOR STUCCO PAINT TABLE

## A. [New] [and Existing] stucco:

## 1. [Latex

[New; MPI EXT 9.1A-G1 (Flat) / Existing; MPI REX 9.1A-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 10 MPI 10 MPI 10

System DFT: 4.5 mils]

[New; MPI EXT 9.1A-G5 (Semigloss) / Existing; MPI REX 9.1A-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 11 MPI 11 MPI 11

System DFT: 4.5 mils]

[New; MPI EXT 9.1A-G6 (Gloss) / Existing; MPI REX 9.1A-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 119 MPI 119 MPI 119

System DFT: 4.5 mils]

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. On existing stucco, apply primer based on surface condition.]

## B. [New] [and Existing] stucco, elastomeric system:

## 1. [Elastomeric Coating

New; MPI EXT 9.1C / Existing; MPI REX 9.1C

Primer: Intermediate: Topcoat:

N/A MPI 113 MPI 113

System DFT: 16 mils

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation and number of coats in accordance with manufacturer's instructions).

NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film thickness of 16 mils.]

## DIVISION 10: EXTERIOR CLOTH COVERINGS AND BITUMINOUS COATED SURFACES PAINT TABLE

A. Insulation and surfaces of insulation coverings (canvas, cloth, paper):  
(Interior and Exterior Applications)

## 1. [Latex

[MPI EXT 10.1A-G1 (Flat)

Primer: Intermediate: Topcoat:

## DIVISION 10: EXTERIOR CLOTH COVERINGS AND BITUMINOUS COATED SURFACES PAINT TABLE

N/A MPI 10 MPI 10  
 System DFT: 3.2 mils]

[MPI EXT 10.1A-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 N/A MPI 11 MPI 11  
 System DFT: 3.2 mils]

[MPI EXT 10.1A-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 N/A MPI 119 MPI 119  
 System DFT: 3.2 mils]

Topcoat: Coating to match adjacent surfaces.]

## 3.15.2 INTERIOR PAINT TABLES

## DIVISION 3: INTERIOR CONCRETE PAINT TABLE

A. [New and uncoated existing] [and Existing, previously painted] Concrete, vertical surfaces, not specified otherwise:

1. [Latex  
 [New; MPI INT 3.1A-G2 (Flat) / Existing; MPI RIN 3.1A-G2 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 50 MPI 44 MPI 44  
 System DFT: 4 mils]
  
- [New; MPI INT 3.1A-G3 (Eggshell) / Existing; MPI RIN 3.1A-G3 (Eggshell)  
 Primer: Intermediate: Topcoat:  
 MPI 50 MPI 52 MPI 52  
 System DFT: 4 mils]
  
- [New; MPI INT 3.1A-G5 (Semigloss) / Existing; MPI RIN 3.1A-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 50 MPI 54 MPI 54  
 System DFT: 4 mils]]
  
2. [High Performance Architectural Latex  
 [New; MPI INT 3.1C-G2 (Flat) / Existing; MPI RIN 3.1J-G2 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 50 MPI 138 MPI 138  
 System DFT: 4 mils]
  
- [New; MPI INT 3.1C-G3 (Eggshell) / Existing; MPI RIN 3.1J-G3 (Eggshell)  
 Primer: Intermediate: Topcoat:  
 MPI 50 MPI 139 MPI 139  
 System DFT: 4 mils]
  
- [New; MPI INT 3.1C-G4 (satin)/ Existing; MPI RIN 3.1J-G4  
 Primer: Intermediate: Topcoat:  
 MPI 50 MPI 140 MPI 140  
 System DFT: 4 mils]
  
- [New; MPI INT 3.1C-G5 (Semigloss) / Existing; MPI RIN 3.1J-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 50 MPI 141 MPI 141

## DIVISION 3: INTERIOR CONCRETE PAINT TABLE

System DFT: 4 mils]]

## 3. [Institutional Low Odor / Low VOC Latex

[New; MPI INT 3.1M-G2 (Flat) / Existing; MPI RIN 3.1L-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 50 MPI 144 MPI 144

System DFT: 4 mils]

[New; MPI INT 3.1M-G3 (Eggshell) / Existing; MPI RIN 3.1L-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 50 MPI 145 MPI 145

System DFT: 4 mils]

[New; MPI INT 3.1M-G4 (satin)/ Existing; MPI RIN 3.1L-G4

Primer: Intermediate: Topcoat:

MPI 50 MPI 146 MPI 146

System DFT: 4 mils]

[New; MPI INT 3.1M-G5 (Semigloss) / Existing; MPI RIN 3.1L-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 50 MPI 147 MPI 147

System DFT: 4 mils]]

## B. Concrete ceilings, uncoated:

## 1. [Latex Aggregate

MPI INT 3.1N

Primer: Intermediate: Topcoat:

N/A N/A MPI 42

System DFT: Per Manufacturer

Texture - [Fine] [Medium] [Coarse]. Surface preparation, number of coats, and primer in accordance with manufacturer's instructions.

Topcoat: Coating to match adjacent surfaces.]

## C. [New and uncoated existing] [and Existing, previously painted] Concrete in [toilets], [food-preparation], [food-serving], [restrooms], [laundry areas], [shower areas], [areas requiring a high degree of sanitation], [\_\_\_\_\_] [and other high-humidity areas] not otherwise specified except floors:

## 1. [Waterborne Light Industrial Coating

[New; MPI INT 3.1L-G3(Eggshell) / Existing; MPI RIN 3.1C-G3(Eggshell)

Primer: Intermediate: Topcoat:

MPI 151 MPI 151 MPI 151

System DFT: 4.8 mils]

[New; MPI INT 3.1L-G5(Semigloss) / Existing; MPI RIN 3.1C-G5(Semigloss)

Primer: Intermediate: Topcoat:

MPI 153 MPI 153 MPI 153

System DFT: 4.8 mils]

[New; MPI INT 3.1L-G6(Gloss) / Existing; MPI RIN 3.1C-G6(Gloss)

Primer: Intermediate: Topcoat:

MPI 154 MPI 154 MPI 154

System DFT: 4.8 mils]]

## 2. [Alkyd

## DIVISION 3: INTERIOR CONCRETE PAINT TABLE

[New; MPI INT 3.1D-G3 (Eggshell) / Existing; RIN 3.1D-G3 (Eggshell)]

Primer: Intermediate: Topcoat:

MPI 50 MPI 51 MPI 51

System DFT: 4.5 mils]

[MPI INT 3.1D-G5 (Semigloss) / Existing; RIN 3.1D-G5 (Semigloss)]

Primer: Intermediate: Topcoat:

MPI 50 MPI 47 MPI 47

System DFT: 4.5 mils]

[MPI INT 3.1D-G6 (Gloss) / Existing; RIN 3.1D-G6 (Gloss)]

Primer: Intermediate: Topcoat:

MPI 50 MPI 48 MPI 48

System DFT: 4.5 mils]]

## 3. [Epoxy

New; MPI INT 3.1F-G6 (Gloss) / Existing; MPI RIN 3.1E-G6 (Gloss)]

Primer: Intermediate: Topcoat:

MPI 77 MPI 77 MPI 77

System DFT: 4 mils

Note: Primer may be reduced for penetration per manufacturer's instructions.]

## D. [New and uncoated existing] [and Existing, previously painted] concrete walls and bottom of swimming pools:

## 1. [Chlorinated Rubber

Primer: Intermediate: Topcoat:

SSPC Paint 18 SSPC Paint 18 SSPC Paint 18

System DFT: Per Manufacturer

Note: Primer may be reduced for penetration per manufacturer's instructions.]

## 2. [Epoxy

New; MPI INT 3.1F / Existing; MPI RIN 3.1E

Primer: Intermediate: Topcoat:

MPI 77 MPI 77 MPI 77

System DFT: 4 mils

Note: Primer may be reduced for penetration per manufacturer's instructions.]

## E. [[New and uncoated existing] [and Existing, previously painted] concrete floors in following areas [\_\_\_\_]:

## 1. [Latex Floor Paint

New; MPI INT 3.2A-G2 (Flat) / Existing; MPI RIN 3.2A-G2 (Flat)]

Primer: Intermediate: Topcoat:

MPI 60 MPI 60 MPI 60

System DFT: 5 mils]

## 2. [Alkyd Floor Paint

New; MPI INT 3.2B-G2 (Flat) / Existing; MPI RIN 3.2B-G2 (Flat)]

Primer: Intermediate: Topcoat:

MPI 59 MPI 59 MPI 59

System DFT: 5 mils]

## DIVISION 3: INTERIOR CONCRETE PAINT TABLE

## 3. [Epoxy

New; MPI INT 3.2C-G6 (Gloss) / Existing; MPI RIN 3.2C-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 77 MPI 77 MPI 77

System DFT: 5 mils]

Note: Primer may be reduced for penetration per manufacturer's instructions.]

## DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

## A. New [and uncoated Existing] Concrete masonry:

## 1. [High Performance Architectural Latex

[MPI INT 4.2D-G2 (Flat)

Filler Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 138 MPI 138

System DFT: 11 mils]

[MPI INT 4.2D-G3 (Eggshell)

Filler Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 139 MPI 139

System DFT: 11 mils]

[MPI INT 4.2D-G4 (Satin)

Filler Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 140 MPI 140

System DFT: 11 mils]

[MPI INT 4.2D-G5 (Semigloss)

Filler Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 141 MPI 141

System DFT: 11 mils]

Fill all holes in masonry surface]

## 2. [Institutional Low Odor / Low VOC Latex

[New; MPI INT 4.2E-G2 (Flat)

Filler Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 144 MPI 144

System DFT: 4 mils]

[New; MPI INT 4.2E-G3 (Eggshell)

Filler Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 145 MPI 145

System DFT: 4 mils]

[New; MPI INT 4.2E-G4 (Satin)

Filler Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 146 MPI 146

System DFT: 4 mils]

[New; MPI INT 4.2E-G5 (Semigloss)

Filler Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 147 MPI 147

System DFT: 4 mils]]

## DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

## B. Existing, previously painted Concrete masonry:

## 1. [High Performance Architectural Latex

[MPI RIN 4.2K-G2 (Flat)

Spot Primer: Intermediate: Topcoat:

MPI 50 MPI 138 MPI 138

System DFT: 4.5 mils]

[MPI RIN 4.2K-G3 (Eggshell)

Spot Primer: Intermediate: Topcoat:

MPI 50 MPI 139 MPI 139

System DFT: 4.5 mils]

[MPI RIN 4.2K-G4

Spot Primer: Intermediate: Topcoat:

MPI 50 MPI 140 MPI 140

System DFT: 4.5 mils]

[MPI RIN 4.2K-G5 (Semigloss)

Spot Primer: Intermediate: Topcoat:

MPI 50 MPI 141 MPI 141

System DFT: 4.5 mils]]

## 2. [Institutional Low Odor / Low VOC Latex

[Existing; MPI RIN 4.2L-G2 (Flat)

Spot Primer: Intermediate: Topcoat:

MPI 50 MPI 144 MPI 144

System DFT: 4 mils]

[Existing; MPI RIN 4.2L-G3 (Eggshell)

Spot Primer: Intermediate: Topcoat:

MPI 50 MPI 145 MPI 145

System DFT: 4 mils]

[Existing; MPI RIN 4.2L-G4 (Satin)

Spot Primer: Intermediate: Topcoat:

MPI 50 MPI 146 MPI 146

System DFT: 4 mils]

[Existing; MPI RIN 4.2L-G5 (Semigloss)

Spot Primer: Intermediate: Topcoat:

MPI 50 MPI 147 MPI 147

System DFT: 4 mils]]

## C. New [and uncoated Existing] Concrete masonry units in [toilets], [food-preparation], [food-serving], [restrooms], [laundry areas], [shower areas], [areas requiring a high degree of sanitation], [\_\_\_\_], [and other high humidity areas] unless otherwise specified:

## 1. [Waterborne Light Industrial Coating

[MPI INT 4.2K-G3(Eggshell)

Filler: Primer: Intermediate: Topcoat:

MPI 4 N/A MPI 151 MPI 151

System DFT: 11 mils]

[MPI INT 4.2K-G5(Semigloss)

Filler: Primer: Intermediate: Topcoat:

## DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

MPI 4 N/A MPI 153 MPI 153  
System DFT: 11 mils]

[MPI INT 4.2K-G6(Gloss)  
Filler: Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 154 MPI 154  
System DFT: 11 mils]

Fill all holes in masonry surface]

2. [Alkyd  
[MPI INT 4.2N-G3 (Eggshell)  
Filler: Primer: Intermediate: Topcoat:  
MPI 4 MPI 50 MPI 51 MPI 51  
System DFT: 12 mils]

[MPI INT 4.2N-G5 (Semigloss)  
Filler: Primer: Intermediate: Topcoat:  
MPI 4 MPI 50 MPI 47 MPI 47  
System DFT: 12 mils]

[MPI INT 4.2N-G6 (Gloss)  
Filler: Primer: Intermediate: Topcoat:  
MPI 4 MPI 50 MPI 48 MPI 48  
System DFT: 12 mils]

Fill all holes in masonry surface]

3. [Epoxy  
MPI INT 4.2G-G6 (Gloss)  
Filler: Primer: Intermediate: Topcoat:  
MPI 116 N/A MPI 77 MPI 77  
System DFT: 10 mils]

Fill all holes in masonry surface]

D. Existing, previously painted, concrete masonry units in [toilets],  
[food-preparation], [food-serving], [restrooms], [laundry areas], [shower  
areas], [areas requiring a high degree of sanitation], [\_\_\_\_], [and  
other high humidity areas] unless otherwise specified:

1. [Waterborne Light Industrial Coating  
[MPI RIN 4.2G-G3(Eggshell)  
Spot Primer: Intermediate: Topcoat:  
MPI 151 MPI 151 MPI 151  
System DFT: 4.5 mils]

[MPI RIN 4.2G-G5(Semigloss)  
Spot Primer: Intermediate: Topcoat:  
MPI 153 MPI 153 MPI 153  
System DFT: 4.5 mils]

[MPI RIN 4.2G-G6(Gloss)  
Spot Primer: Intermediate: Topcoat:  
MPI 154 MPI 154 MPI 154  
System DFT: 4.5 mils]]

2. [Alkyd

## DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

[MPI RIN 4.2C-G3 (Eggshell)  
 Spot Primer: Intermediate: Topcoat:  
 MPI 50 MPI 51 MPI 51  
 System DFT: 4.5 mils]

[MPI RIN 4.2C-G5 (Semigloss)  
 Spot Primer: Intermediate: Topcoat:  
 MPI 50 MPI 47 MPI 47  
 System DFT: 4.5 mils]

[MPI RIN 4.2C-G6 (Gloss)  
 Spot Primer: Intermediate: Topcoat:  
 MPI 50 MPI 48 MPI 48  
 System DFT: 4.5 mils]]

3. [Epoxy  
 MPI RIN 4.2D-G6 (Gloss)  
 Spot Primer: Intermediate: Topcoat:  
 MPI 77 MPI 77 MPI 77  
 System DFT: 5 mils]

## DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

## INTERIOR STEEL / FERROUS SURFACES

- A. Metal, [Mechanical,] [Electrical,] [Fire extinguishing sprinkler systems including valves, conduit, hangers, supports,] [Surfaces adjacent to painted surfaces (Match surrounding finish),] [exposed copper piping,] [and miscellaneous metal items] not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. [High Performance Architectural Latex  
 [MPI INT 5.1R-G2 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 79 MPI 138 MPI 138  
 System DFT: 5 mils]

[MPI INT 5.1R-G3 (Eggshell)  
 Primer: Intermediate: Topcoat:  
 MPI 79 MPI 139 MPI 139  
 System DFT: 5 mils]

[MPI INT 5.1R-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 79 MPI 141 MPI 141  
 System DFT: 5 mils]]

2. [Alkyd  
 [MPI INT 5.1E-G2 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 79 MPI 49 MPI 49  
 System DFT: 5.25 mils]

[MPI INT 5.1E-G3 (Eggshell)  
 Primer: Intermediate: Topcoat:  
 MPI 79 MPI 51 MPI 51

## INTERIOR STEEL / FERROUS SURFACES

System DFT: 5.25 mils]

[MPI INT 5.1E-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 79 MPI 47 MPI 47

System DFT: 5.25 mils]

[MPI INT 5.1E-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 79 MPI 48 MPI 48

System DFT: 5.25 mils]]

## B. Metal floors (non-shop-primed surfaces or non-slip deck surfaces) with non-skid additive (NSA), load at manufacturer's recommendations.:

## 1. [Alkyd Floor Paint

MPI INT 5.1U-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 79 MPI 27 MPI 27 (plus NSA)

System DFT: 5.25 mils]

## 2. [Epoxy

MPI INT 5.1L-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 101 MPI 77 MPI 77 (plus NSA)

System DFT: 5.25 mils]

## C. Metal in [toilets], [food-preparation], [food-serving], [restrooms], [laundry areas], [shower areas], [areas requiring a high degree of sanitation], [\_\_\_\_], [and other high-humidity areas] not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

## 1. [Alkyd

[MPI INT 5.1E-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 79 MPI 51 MPI 51

System DFT: 5.25 mils]

[MPI INT 5.1E-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 79 MPI 47 MPI 47

System DFT: 5.25 mils]

[MPI INT 5.1E-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 79 MPI 48 MPI 48

System DFT: 5.25 mils]]

## 2. [Alkyd

[MPI INT 5.1T-G3 (Eggshell) For hand tool cleaning

Primer: Intermediate: Topcoat:

MPI 23 MPI 51 MPI 51

System DFT: 5.25 mils]

[MPI INT 5.1T-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 23 MPI 47 MPI 47

## INTERIOR STEEL / FERROUS SURFACES

System DFT: 5.25 mils]

[MPI INT 5.1T-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 23 MPI 48 MPI 48

System DFT: 5.25 mils]]

- D. Ferrous metal in concealed damp spaces or in exposed areas having unpainted adjacent surfaces as follows: [\_\_\_\_\_]

## 1. [Aluminum Paint

MPI INT 5.1M

Primer: Intermediate: Topcoat:

MPI 79 MPI 1 MPI 1

System DFT: 4.25 mils]

- E. Miscellaneous non-ferrous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

## 1. [High Performance Architectural Latex

[MPI INT 5.4F-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 95 MPI 138 MPI 138

System DFT: 5 mils]

[MPI INT 5.4F-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 95 MPI 139 MPI 139

System DFT: 5 mils]

[MPI INT 5.4F-G4 (Satin)

Primer: Intermediate: Topcoat:

MPI 95 MPI 140 MPI 140

System DFT: 5 mils]

[MPI INT 5.4F-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 95 MPI 141 MPI 141

System DFT: 5 mils]]

## 2. [Alkyd

[MPI INT 5.4J-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 95 MPI 49 MPI 49

System DFT: 5 mils]

[MPI INT 5.4J-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 95 MPI 51 MPI 51

System DFT: 5 mils]

[MPI INT 5.4J-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 95 MPI 47 MPI 47

System DFT: 5 mils]

INTERIOR STEEL / FERROUS SURFACES

[MPI INT 5.4J-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 95 MPI 48 MPI 48

System DFT: 5 mils]]

F. Hot metal surfaces [including smokestacks] subject to temperatures up to 400 degrees F:

1. [Heat Resistant Enamel

MPI INT 5.2A

Primer: Intermediate: Topcoat:

MPI 21 Surface preparation and number of coats per manufacturer's instructions.

System DFT: Per Manufacturer]

G. Ferrous metal subject to high temperature, up to 750 degrees F:

1. [Inorganic Zinc Rich Coating

MPI INT 5.2C

Primer: Intermediate: Topcoat:

MPI 19 Surface preparation and number of coats per manufacturer's instructions.

System DFT: Per Manufacturer]

2. [Heat Resistant Aluminum Paint

MPI INT 5.2B (Aluminum Finish)

Primer: Intermediate: Topcoat:

MPI 2 Surface preparation and number of coats per manufacturer's instructions.

System DFT: Per Manufacturer]

H. [New surfaces and] [Existing surfaces] made bare cleaning to SSPC SP 10/NACE No. 2

subject to temperatures up to 593 degrees C (1100 degrees F):

1. [High Heat Resistant Coating

MPI INT 5.2D

Primer: Intermediate: Topcoat:

MPI 22 Surface preparation and number of coats per manufacturer's instructions.

System DFT: Per Manufacturer]

DIVISION 6: INTERIOR WOOD PAINT TABLE

A. New [and Existing, uncoated] Wood and plywood not otherwise specified:

1. [High Performance Architectural Latex

[MPI INT 6.4S-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 39 MPI 139 MPI 139

System DFT: 4.5 mils]

[MPI INT 6.4S-G4 (Satin)

Primer: Intermediate: Topcoat:

MPI 39 MPI 140 MPI 140

System DFT: 4.5 mils]

## DIVISION 6: INTERIOR WOOD PAINT TABLE

[MPI INT 6.4S-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 39 MPI 141 MPI 141  
 System DFT: 4.5 mils]]

2. [Alkyd  
 [MPI INT 6.4B-G3 (Eggshell)  
 Primer: Intermediate: Topcoat:  
 MPI 45 MPI 51 MPI 51  
 System DFT: 4.5 mils]

[MPI INT 6.4B-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 45 MPI 47 MPI 47  
 System DFT: 4.5 mils]

[MPI INT 6.4B-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 MPI 45 MPI 48 MPI 48  
 System DFT: 4.5 mils]]

3. [Institutional Low Odor / Low VOC Latex  
 [New; MPI INT 6.3V-G2 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 39 MPI 144 MPI 144  
 System DFT: 4 mils]

[New; MPI INT 6.3V-G3 (Eggshell)  
 Primer: Intermediate: Topcoat:  
 MPI 39 MPI 145 MPI 145  
 System DFT: 4 mils]

[New; MPI INT 6.3V-G4  
 Primer: Intermediate: Topcoat:  
 MPI 39 MPI 146 MPI 146  
 System DFT: 4 mils]

[New; MPI INT 6.3V-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:  
 MPI 39 MPI 147 MPI 147  
 System DFT: 4 mils]]

## B. Existing, previously painted Wood and plywood not otherwise specified:

1. [High Performance Architectural Latex  
 [MPI RIN 6.4B-G3 (Eggshell)  
 Primer: Intermediate: Topcoat:  
 MPI 46 MPI 139 MPI 139  
 System DFT: 4.5 mils]

[MPI RIN 6.4B-G4 (Satin)  
 Primer: Intermediate: Topcoat:  
 MPI 46 MPI 140 MPI 140  
 System DFT: 4.5 mils]

[MPI RIN 6.4B-G5 (Semigloss)  
 Primer: Intermediate: Topcoat:

## DIVISION 6: INTERIOR WOOD PAINT TABLE

MPI 46 MPI 141 MPI 141

System DFT: 4.5 mils]]

## 2. [Alkyd

[MPI RIN 6.4C-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 46 MPI 51 MPI 51

System DFT: 4.5 mils]

[MPI RIN 6.4C-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 46 MPI 47 MPI 47

System DFT: 4.5 mils]

[MPI RIN 6.4C-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 46 MPI 48 MPI 48

System DFT: 4.5 mils]]

## 3. [Institutional Low Odor / Low VOC Latex

[Existing; MPI RIN 6.4D-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 39 MPI 144 MPI 144

System DFT: 4 mils]

[Existing; MPI RIN 6.4D-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 39 MPI 145 MPI 145

System DFT: 4 mils]

[Existing; MPI RIN 6.4D-G4

Primer: Intermediate: Topcoat:

MPI 39 MPI 146 MPI 146

System DFT: 4 mils]

[Existing; MPI RIN 6.4D-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 39 MPI 147 MPI 147

System DFT: 4 mils]]

## C. New [and Existing, previously finished or stained] Wood and Plywood, except floors; natural finish or stained:

## 1. [Natural finish, oil-modified polyurethane

[New; MPI INT 6.4J-G4 / Existing; MPI RIN 6.4L-G4

Primer: Intermediate: Topcoat:

MPI 57 MPI 57 MPI 57

System DFT: 4 mils]

[New; MPI INT 6.4J-G6 (Gloss) / Existing; MPI RIN 6.4L-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 56 MPI 56 MPI 56

System DFT: 4 mils]]

## 2. [Stained, oil-modified polyurethane

[New; MPI INT 6.4E-G4 / Existing; MPI RIN 6.4G-G4

Stain: Primer: Intermediate: Topcoat:

MPI 90 MPI 57 MPI 57 MPI 57

## DIVISION 6: INTERIOR WOOD PAINT TABLE

System DFT: 4 mils]

[New; MPI INT 6.4E-G6 (Gloss) / Existing; MPI RIN 6.4G-G6 (Gloss)  
 Stain: Primer: Intermediate: Topcoat:  
 MPI 90 MPI 56 MPI 56 MPI 56  
 System DFT: 4 mils]]

## 3. [Stained, Moisture Cured Urethane

[New; MPI INT 6.4V-G2 (Flat) / Existing; MPI RIN 6.4V-G2 (Flat)  
 Stain: Primer: Intermediate: Topcoat:  
 MPI 90 MPI 71 MPI 71 MPI 71  
 System DFT: 4 mils]

[New; MPI INT 6.4V-G6 (Gloss) / Existing; MPI RIN 6.4V-G6 (Gloss)  
 Stain: Primer: Intermediate: Topcoat:  
 MPI 90 MPI 31 MPI 31 MPI 31  
 System DFT: 4 mils]]

## D. New [and Existing, previously finished or stained] Wood Floors; Natural finish or stained:

## 1. [Natural finish, oil-modified polyurethane

New; MPI INT 6.5C-G6 (Gloss) / Existing; MPI RIN 6.5C-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 MPI 56 MPI 56 MPI 56  
 System DFT: 4 mils]

## 2. [Natural finish, Moisture Cured Polyurethane

New; MPI INT 6.5K-G6 (Gloss) / Existing; MPI RIN 6.5D-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 MPI 31 MPI 31 MPI 31  
 System DFT: 4 mils]

## 3. [Stained, oil-modified polyurethane

New; MPI INT 6.5B-G6 (Gloss) / Existing; MPI RIN 6.5B-G6 (Gloss)  
 Stain: Primer: Intermediate: Topcoat:  
 MPI 90 MPI 56 MPI 56 MPI 56  
 System DFT: 4 mils]

## 4. [Stained, Moisture Cured Polyurethane

New; MPI INT 6.5J-G6 (Gloss) / Existing; MPI RIN 6.5L-G6 (Gloss)  
 Stain: Primer: Intermediate: Topcoat:  
 MPI 90 MPI 31 MPI 31 MPI 31  
 System DFT: 4 mils]

## E. New [and Existing, previously coated] Wood floors; pigmented finish:

## 1. [Latex Floor Paint

[New; MPI INT 6.5G-G2 (Flat) / Existing; MPI RIN 6.5J-G2 (Flat)  
 Primer: Intermediate: Topcoat:  
 MPI 45 MPI 60 MPI 60  
 System DFT: 4.5 mils]

[New; MPI INT 6.5G-G6 (Gloss) / Existing; MPI RIN 6.5J-G6 (Gloss)  
 Primer: Intermediate: Topcoat:  
 MPI 45 MPI 68 MPI 68  
 System DFT: 4.5 mils]]

## DIVISION 6: INTERIOR WOOD PAINT TABLE

## 2. [Alkyd Floor Paint

[New; MPI INT 6.5A-G2 (Flat) / Existing; MPI RIN 6.5A-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 59 MPI 59 MPI 59

System DFT: 4.5 mils]

[New; MPI INT 6.5A-G6 (Gloss) / Existing; MPI RIN 6.5A-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 27 MPI 27 MPI 27

System DFT: 4.5 mils]]

F. New [and Existing, uncoated] wood surfaces in [toilets], [food-preparation], [food-serving], [restrooms], [laundry areas], [shower areas], [areas requiring a high degree of sanitation], [\_\_\_\_\_] [and other high humidity areas] not otherwise specified.:

## 1. [As specified in Section 09 96 59 HIGH-BUILD GLAZE COATINGS.]

## 2. [Waterborne Light Industrial

[MPI INT 6.3P-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 153 MPI 153

System DFT: 4.5 mils]

[MPI INT 6.3P-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 154 MPI 154

System DFT: 4.5 mils]]

## 3. [Alkyd

[MPI INT 6.3B-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 47 MPI 47

System DFT: 4.5 mils]

[MPI INT 6.3B-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 48 MPI 48

System DFT: 4.5 mils]]

G. Existing, previously painted wood surfaces in [toilets], [food-preparation], [food-serving], [restrooms], [laundry areas], [shower areas], [areas requiring a high degree of sanitation], [\_\_\_\_\_] [and other high humidity areas] not otherwise specified:

## 1. [As specified in Section 09 96 59 HIGH-BUILD GLAZE COATINGS.]

## 2. [Waterborne Light Industrial Coating

[MPI RIN 6.3P-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 46 MPI 153 MPI 153

System DFT: 4.5 mils]

[MPI RIN 6.3P-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 46 MPI 154 MPI 154

System DFT: 4.5 mils]]

## DIVISION 6: INTERIOR WOOD PAINT TABLE

## 3. [Alkyd

[MPI RIN 6.3B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 46	MPI 47	MPI 47
System DFT: 4.5 mils]		

[MPI RIN 6.3B-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 46	MPI 48	MPI 48
System DFT: 4.5 mils]]		

## H. New [and Existing, previously finished or stained] Wood Doors; Natural Finish or Stained:

## 1. [Natural finish, oil-modified polyurethane

[New; MPI INT 6.3K-G4 / Existing; MPI RIN 6.3K-G4

Primer:	Intermediate:	Topcoat:
MPI 57	MPI 57	MPI 57
System DFT: 4 mils]		

[New; MPI INT 6.3K-G6 (Gloss) / Existing; MPI RIN 6.3K-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 56	MPI 56	MPI 56
System DFT: 4 mils]		

Note: Sand between all coats per manufacturers recommendations.]

## 2. [Stained, oil-modified polyurethane

[New; MPI INT 6.3E-G4 / Existing; MPI RIN 6.3E-G4

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 57	MPI 57	MPI 57
System DFT: 4 mils]			

[New; MPI INT 6.3E-G6 (Gloss) / Existing; MPI RIN 6.3E-G6 (Gloss)

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 56	MPI 56	MPI 56
System DFT: 4 mils]			

Note: Sand between all coats per manufacturers recommendations.]

## 3. [Stained, Moisture Cured Urethane

[New; MPI INT 6.4V-G2 (Flat) / Existing; MPI RIN 6.4V-G2 (Flat)

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 71	MPI 71	MPI 71
System DFT: 4 mils]			

[New; MPI INT 6.4V-G6 (Gloss) / Existing; MPI RIN 6.4V-G6 (Gloss)

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 31	MPI 31	MPI 31
System DFT: 4 mils]			

Note: Sand between all coats per manufacturers recommendations.]

## I. New [and Existing, uncoated] Wood Doors; Pigmented finish:

## 1. [Alkyd

[New; MPI INT 6.3B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
---------	---------------	----------

## DIVISION 6: INTERIOR WOOD PAINT TABLE

MPI 45 MPI 47 MPI 47

System DFT: 4.5 mils]

[New; MPI INT 6.3B-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 48 MPI 48

System DFT: 4.5 mils]

Note: Sand between all coats per manufacturers recommendations.]

## 2. [Pigmented Polyurethane

New; MPI INT 6.1E-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 72 MPI 72 MPI 72

System DFT: 4.5 mils]

Note: Sand between all coats per manufacturers recommendations.]

## J. Existing, previously painted Wood Doors; Pigmented finish:

## 1. [Alkyd

[New; MPI RIN 6.3B-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 46 MPI 47 MPI 47

System DFT: 4.5 mils]

[New; MPI RIN 6.3B-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 46 MPI 48 MPI 48

System DFT: 4.5 mils]

Note: Sand between all coats per manufacturers recommendations.]

## DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

## A. New [and Existing, previously painted] [Plaster] [and] [Wallboard] not otherwise specified:

## 1. [Latex

[New; MPI INT 9.2A-G2 (Flat) / Existing; RIN 9.2A-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 50 MPI 44 MPI 44

System DFT: 4 mils]

[New; MPI INT 9.2A-G3 (Eggshell) / Existing; RIN 9.2A-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 50 MPI 52 MPI 52

System DFT: 4 mils]

[New; MPI INT 9.2A-G5 (Semigloss) / Existing; RIN 9.2A-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 50 MPI 54 MPI 54

System DFT: 4 mils]]

## 2. [High Performance Architectural Latex - High Traffic Areas

[New; MPI INT 9.2B-G2 (Flat) / Existing; MPI RIN 9.2B-G2 (Flat)

## DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 138	MPI 138
System DFT: 4 mils]		

[New; MPI INT 9.2B-G3 (Eggshell) / Existing; MPI RIN 9.2B-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 139	MPI 139
System DFT: 4 mils]		

[New; MPI INT 9.2B-G5 (Semigloss) / Existing; MPI RIN 9.2B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 141	MPI 141
System DFT: 4 mils]]		

## 3. [Institutional Low Odor / Low VOC Latex

[New; MPI INT 9.2M-G2 (Flat) / Existing; MPI RIN 9.2M-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 144	MPI 144
System DFT: 4 mils]		

[New; MPI INT 9.2M-G3 (Eggshell) / Existing; MPI RIN 9.2M-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 145	MPI 145
System DFT: 4 mils]		

[New; MPI INT 9.2M-G4 (Satin) / Existing; MPI RIN 9.2M-G4 (Satin)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 146	MPI 146
System DFT: 4 mils]		

[New; MPI INT 9.2M-G5 (Semigloss) / Existing; MPI RIN 9.2M-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 147	MPI 147
System DFT: 4 mils]]		

B. New [and Existing, previously painted] [Plaster] [and] [Wallboard] in [toilets], [food-preparation], [food-serving], [restrooms], [laundry areas], [shower areas], [areas requiring a high degree of sanitation], [\_\_\_\_\_] [and other high humidity areas] not otherwise specified.:

## 1. [Waterborne Light Industrial Coating

New; MPI INT 9.2L-G5 (Semigloss) / Existing; MPI RIN 9.2L-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 153	MPI 153
System DFT: 4 mils]		

## 2. [Alkyd

New; MPI INT 9.2C-G5 (Semigloss) / Existing; MPI RIN 9.2C-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 47	MPI 47
System DFT: 4 mils]		

## 3. [Epoxy

New; MPI INT 9.2E-G6 (Gloss) / Existing; MPI RIN 9.2D-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 77	MPI 77
System DFT: 4 mils]		

-- End of Section --

## SECTION 09 97 13.27

EXTERIOR COATING OF STEEL STRUCTURES  
10/16

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM D1200	(2010; R 2014) Viscosity by Ford Viscosity Cup
ASTM D1640/D1640M	(2014) Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings
ASTM D3276	(2015; E 2016) Standard Guide for Painting Inspectors (Metal Substrates)
ASTM D3925	(2002; R 2015) Sampling Liquid Paints and Related Pigmented Coatings
ASTM D4285	(1983; R 2012) Indicating Oil or Water in Compressed Air
ASTM D7127	(2013) Measurement of Surface Roughness of Abrasive Blast Cleaned Metal Surfaces using a Portable Stylus Instrument

## INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 9001	(2008; Corr 1 2009) Quality Management Systems- Requirements
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## SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC 7/NACE No.4	(2007; E 2004) Brush-Off Blast Cleaning
SSPC Guide 12	(1998; E 2004) Guide for Illumination of Industrial Painting Projects
SSPC Guide 6	(2015) Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations
SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals
SSPC PA 2	(2015) Procedure for Determining Conformance to Dry Coating Thickness Requirements

SSPC QP 1	(2012; E 2012) Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures)
SSPC QS 1	(2015) Standard Procedure for Evaluating a Contractor's Advanced Quality Management System
SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 10/NACE No. 2	(2007) Near-White Blast Cleaning
SSPC SP COM	(2016; E 2017) Surface Preparation Commentary for Steel and Concrete Substrates
SSPC VIS 1	(2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-A-22262	(1993; Rev B; Am 2 1996) Abrasive Blasting Media Ship Hull Blast Cleaning
MIL-DTL-24441	(2009; Rev D) Paint, Epoxy-Polyamide, General Specification for
MIL-DTL-24441/19	(2009; Rev C) Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III
MIL-DTL-24441/31	(2009; Rev B) Paint, Epoxy-Polyamide, White, Formula 152, Type IV
MIL-PRF-85285	(2012; Rev E; Notice 1 2016) Coating: Polyurethane Aircraft and Support Equipment

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595	(Rev C; Notice 1) Colors Used in Government Procurement
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910-SUBPART Z	Toxic and Hazardous Substances
29 CFR 1910.1000	Air Contaminants
29 CFR 1910.134	Respiratory Protection
29 CFR 1926.59	Hazard Communication

1.2 DEFINITIONS

Definitions are provided throughout this Section, generally in the paragraph where used, and denoted by capital letters.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-05, Design Data

Containment System

#### SD-07 Certificates

Contract Errors, Omissions, and Other Discrepancies

Corrective Action Procedures

Coating Work Plan

Qualifications of Certified Industrial Hygienist (CIH)

Qualifications Of Individuals Performing Abrasive Blasting

Qualifications of Coating Contractors

Joint Sealant Materials

Coating Materials

Coating System Component Compatibility

Non-metallic Abrasive

#### SD-08 Manufacturer's Instructions

Joint Sealant Instructions

Coating System Instructions

#### SD-11 Closeout Submittals

Disposal of Used Abrasive

Inspection Logbook; G[, [\_\_\_\_]]

#### 1.4 QUALITY ASSURANCE

##### 1.4.1 Contract Errors, Omissions, and Other Discrepancies

Submit all errors, omissions, and other discrepancies in contract documents the Contracting Officer within 30 days of contract award for all work covered in this Section, other than the work that will not be uncovered until a later date. All such discrepancies shall be addressed and resolved, and the Coating Work Plan modified, prior to beginning the Initial and Follow-Up phases of work. Discrepancies that become apparent only after work is uncovered shall be identified at the earliest discoverable time and submitted for resolution. Schedule time (Float) should be built into the project schedule at those points where old work is to be uncovered or where access is not available during the first 30 days after award, to allow for resolution of contract discrepancies.

##### 1.4.2 Corrective Action (CA)

CA shall be included in the Quality Control Plan.

##### 1.4.2.1 Corrective Action Procedures

Develop procedures for determining the root cause of each non-compliance, developing a plan to eliminate the root cause so that the non-compliance does not recur, and following up to ensure that the root cause was eliminated. Develop Corrective Action Request (CAR) forms for initiating CA, and for tracking and documenting each step.

##### 1.4.2.2 Implement Corrective Action

The Contractor shall take action to identify and eliminate the root cause of each non-compliance so as to prevent recurrence. These procedures shall apply to non-compliance in the work, and to non-compliance in the QC System. Corrective actions shall be appropriate to the effects of the non-compliance encountered. Each CAR shall be serialized, tracked in a Log to completion and acceptance by the Contracting Officer, and retained in project records. The Corrective Action Log, showing status of each CAR, shall be submitted to the Contracting Officer monthly. A CAR may be initiated by either the Contractor or the Contracting Officer. The Contracting Officer must approve each CAR at the root cause identification stage, the plan for elimination stage, and the close out stage after verification that the root cause has been eliminated.

##### 1.4.3 Coating Work Plan

This work plan shall be considered as part of the Quality Control Plan.

Provide procedures for reviewing contract documents immediately after award to identify errors, omissions, and discrepancies so that any such issues can be resolved prior to project planning and development of detailed procedures.

Provide procedures for verification of key processes during Initial Phase to ensure that contract requirements can be met. Key processes shall include surface preparation, coating application and curing, inspection, and documentation, and any other process that might adversely impact orderly progression of work.

Provide procedures for all phases of coating operations, including planned

work, rework, repair, inspection, and documentation. Address mobilization and setup, surface preparation, coating application, coating initial cure, tracking and correction of noncompliant work, and demobilization. Coordinate work processes with health and safety plans and confined space entry plans. For each process, provide procedures that include appropriate work instructions, material and equipment requirements, personnel qualifications, controls, and process verification procedures. Provide procedures for inspecting work to verify and document compliance with contract requirements, including inspection forms and checklists, and acceptance and rejection criteria.

Provide procedures for correcting noncompliant work. Detailed procedures are required in advance to avoid delays in meeting overcoat windows as well as to avoid delays in production. Provide procedures for repairing defects in the coating film, such as runs, drips, sags, holidays, overspray, as well as how to handle correct coating thickness noncompliance, any other areas of repair or rework that might be adversely affected by delays in preparing and approving new procedures.

If a procedure is based on a proposed or approved request for deviation, the deviation shall be referenced. Changes to procedures shall be noted by submittal number and date approved, clearly delineating old requirements and new requirements, so that the records provide a continuous log of requirements and procedures.

#### 1.4.4 Design Data

##### 1.4.4.1 Containment System

Submit complete design drawings and calculations for the scaffolding and containment system, including an analysis of the loads which will be added to the structure by the containment system and waste materials. A registered engineer shall approve calculations and scaffold system design.

#### 1.4.5 Test Reports

##### 1.4.5.1 Joint Sealant Qualification Test Reports

Not Applicable

##### 1.4.5.2 Coatings Qualification Test Reports

Not Applicable

##### 1.4.5.3 Metallic Abrasive Qualification Test Reports

Not Applicable

##### 1.4.5.4 Recycled Metallic Abrasive Field Test Reports (Daily and Weekly)

Not Applicable

#### 1.4.6 Qualifications

##### 1.4.6.1 Qualifications of Certified Industrial Hygienist (CIH)

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party CIH. Submit documentation that hygienist is certified by the American Board of Industrial Hygiene in comprehensive

practice, including certification number and date of certification/recertification. Provide evidence of experience with hazards involved in industrial coating application work.

1.4.6.2 Qualifications of Certified Protective Coatings Specialist (PCS)

Not Applicable

1.4.6.3 Qualifications of Coating Inspection Company

Not Applicable

1.4.6.4 Qualifications of QC Specialist Coating Inspector

Not Applicable

1.4.6.5 Qualifications Of Individuals Performing Abrasive Blasting

Submit name, address, and telephone number of each person that will be performing abrasive blasting. Submit documentation that each blaster is qualified by SSPC to the SSPC C-7 Dry Abrasive Blaster Qualification Program. Each blaster shall remain qualified during the entire period of abrasive blasting, and the Contracting Officer shall be notified of any change in qualification status.

1.4.6.6 Qualifications of Testing Laboratory for Coatings

Not Applicable

1.4.6.7 Qualifications of Testing Laboratory for Abrasive

Not Applicable

1.4.6.8 Qualifications of Coating Contractors

All Contractors and Subcontractors that perform surface preparation or coating application shall be certified to either ISO 9001 or SSPC QP 1 and SSPC QS 1 prior to contract award, and shall remain certified while accomplishing any surface preparation or coating application. The painting Contractors and painting Subcontractors must remain so certified for the duration of the project. If a Contractor's or Subcontractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in Contractor certification status.

1.4.6.9 Joint Sealant Materials

Provide manufacturer's certification of conformance to contract requirements.

1.4.6.10 Coating Materials

Provide manufacturer's certification of conformance to contract requirements.

#### 1.4.6.11 Coating System Component Compatibility

Provide certification from each manufacturer of components of the coating system, epoxy primer, epoxy intermediate, and polyurethane topcoat, that the supplied coating material is suitable for use in the specified coating system. Each manufacturer shall identify the specific products, including manufacturer's name, which their product may be used with. The certification shall provide the name of the manufacturer that will provide technical support for the entire system. When all coating materials are manufactured by one manufacturer, this certification is not required.

#### 1.4.6.12 Non-metallic Abrasive

Provide manufacturer's certification that the materials are currently approved by the Naval Sea Systems Command and listed on the Qualified Products Lists (QPL) for the specified materials.

#### 1.4.6.13 Metallic Abrasive

Not Applicable

#### 1.4.7 Protective Coating Specialist (PCS)

Not Applicable

#### 1.4.8 Pre-Application Meeting

After approval of submittals but prior to the initiation of coating work, Contractor representatives, including at a minimum, project superintendent and QC manager, and paint foreman shall have a pre-application coating preparatory meeting. This meeting shall be in addition to the pre-construction conference. Specific items addressed shall include: corrective action requirements and procedures, coating work plan, safety plan, coordination with other Sections, inspection standards, inspection requirements and tools, environmental control system, and safety plan. Notify Contracting Officer at least ten days prior to meeting.

### 1.5 PRODUCT DATA

#### 1.5.1 Joint Sealant Instructions

Submit manufacturer's printed instructions including detailed application procedures, minimum and maximum application temperatures, and curing procedures. Include Safety Data Sheets (SDS) for materials to be used at the job site in accordance with 29 CFR 1926.59.

#### 1.5.2 Coating System Instructions

Submit manufacturer's printed instructions including detailed mixing and application procedures, number and types of coats required, minimum and maximum application temperatures, and curing procedures. Include Safety Data Sheets (SDS) for materials to be used at the job site in accordance with 29 CFR 1926.59.

### 1.6 DELIVERY AND STORAGE

Ship, store, and handle materials in accordance with SSPC PA 1, and as modified in this Section. Maintain temperature in storage spaces between 40 and 85 degrees F, and air temperature more than 5 degrees F above the

dew-point at all times. Inspect materials for damage prior to use and return non-compliant materials to manufacturer. Remove materials with expired shelf life from government property immediately and notify the Contracting Officer.

If materials are approaching shelf life expiration and an extension is desired, samples may be sent to the manufacturer, along with complete records of storage conditions, with a request for shelf life extension. If the manufacturer finds the samples and storage data suitable for shelf life extension, the manufacturer may issue an extension, referencing the product evaluation and the review of storage records. Products may not be extended longer than allowed in the product specification.

#### 1.7 COATING HAZARDS

Ensure that employees are trained in all aspects of the safety plan. Specified coatings may have potential health hazards if ingested or improperly handled. The coating manufacturer's written safety precautions shall be followed throughout mixing, application, and curing of the coatings. During all cleaning, cleanup, surface preparation, and paint application phases, ensure that employees are protected from toxic and hazardous chemical agents which exceed concentrations in 29 CFR 1910.1000. Comply with respiratory protection requirements in 29 CFR 1910.134. The CIH shall approve work procedures and personal protective equipment.

#### 1.8 JOB SITE REFERENCES

Make available to the Contracting Officer at least one copy each of ASTM D3276, ASTM D3925, ASTM D4285, ASTM D7127, SSPC SP COM, SSPC SP 1, SSPC 7/NACE No.4, SSPC SP 10/NACE No. 2, SSPC PA 1, SSPC PA 2, SSPC Guide 6, SSPC VIS 1, SSPC QP 1, SSPC QS 1, and an SSPC Certified Contractor Evaluation Form at the job site.

### PART 2 PRODUCTS

#### 2.1 JOINT SEALANT

TT-S-00230, Type II, Class B

#### 2.2 COATING SYSTEM

Alternate systems or products will not be considered. All primer, intermediate coat and topcoat materials shall be supplied by one supplier. The entire coating system is intended to be applied in the field.

The Military specification epoxy and polyurethane products specified in this Section do not require approval for listing on the QPL prior to contract award, as indicated in paragraph 3.2 of MIL-DTL-24441 and paragraph 3.1 of MIL-PRF-85285. Testing of products by an independent laboratory to the QUALIFICATION INSPECTION requirements of MIL-DTL-24441 and MIL-PRF-85285 prior to contract award is required. See specific submittal requirements in paragraph QUALITY ASSURANCE.

##### 2.2.1 Zinc-Rich Epoxy Primer Coat

Not Applicable

## 2.2.2 Epoxy Intermediate Coat

Not Applicable

## 2.2.3 Polyurethane Topcoat

Not Applicable

## [2.3 COLOR IDENTIFICATION OF FUEL HANDLING AND STORAGE FACILITIES

Not Applicable

## ]2.4 COATING SAMPLE COLLECTION AND SHIPPING KIT

Not Applicable

## 2.5 ABRASIVE SAMPLE COLLECTION AND SHIPPING KIT

Not Applicable

## 2.6 TEST KITS

## 2.6.1 Test Kit for Measuring Chloride, Sulfate and Nitrate Ions on Steel and Coated Surfaces

Not Applicable.

## 2.6.2 Test Kit for Identifying Amine Blush on Epoxy Surfaces

Not Applicable.

## 2.7 ABRASIVE

The referenced abrasive specifications have maximum limits for soluble salts contamination, however, this maximum level of contamination does not guarantee that contamination will not be transferred to the steel surface during abrasive blasting. Other factors such as on-site handling and recycling can allow contamination of abrasive. Contractors are cautioned to verify that the chosen abrasive, along with work and storage processes, allow the final surface cleanliness requirements to be achieved. Successful testing of chlorides in abrasive does not negate the final acceptance testing of steel surfaces.

[ Interpret MIL-A-22262 to include the meaning that abrasive material contains a maximum one percent by weight of any toxic substance listed in either Table Z-1, Z-2, or Z-3 or 29 CFR 1910-SUBPART Z, with the exception of inert or nuisance dust materials, arsenic, beryllium, cadmium, cobalt, lead, mercury, rhodium, silver, tellurium, thallium, and uranium.  
]

## 2.7.1 Non-metallic Abrasive

Conform to MIL-A-22262, Type I (Inorganic materials). Abrasive shall be approved by the Naval Sea Systems Command and listed on the appropriate Qualified Products List (QPL) for the specified materials. Use sampling procedures and testing frequencies as prescribed in MIL-A-22262. Use abrasive that is specifically selected and graded to provide a sharp, angular profile to the specified depth. Do not use ungraded abrasive. Make adjustments to processes or abrasive gradation to achieve specified surface profile. Recycled non-metallic abrasive shall meet all

requirements of the specification each time that it is placed in the blast pot.

## 2.7.2 Metallic Abrasive

### 2.7.2.1 New and Remanufactured Steel Grit

Not Applicable.

### 2.7.2.2 Recycled Steel Grit

Not Applicable.

## 2.8 WHITE ALUMINUM OXIDE NON-SKID GRIT

Not Applicable

## PART 3 EXECUTION

Perform all work, rework, and repair in accordance with approved procedures in the Coating Work Plan.

### [3.1 REMOVAL OF COATINGS CONTAINING HAZARDOUS MATERIALS

Coatings containing hazardous materials and identified for disturbance during surface preparation, including removal, shall be handled in accordance with Section 02 82 33.13 20 REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD. Coordinate surface preparation requirements from Section 02 82 33.13 20 REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD with this Section.

### ]3.2 COATING AND ABRASIVE SAMPLE COLLECTION AND TESTING

Not Applicable.

#### 3.2.1 Coating Sample Collection

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#### 3.2.2 Abrasive Sample Collection

Not Applicable.

#### 3.2.3 Coating Sample Test Reports

Not Applicable.

#### 3.2.4 Abrasive Sample Test Reports

Not Applicable

### 3.3 SURFACES TO BE COATED

Coat exterior surfaces of hisotric artifactsincluding other exterior appurtenances.

### 3.4 LIGHTING

Provide lighting for all work areas as prescribed in SSPC Guide 12.

### 3.5 ENVIRONMENTAL CONDITIONS

#### 3.5.1 Containment

Design and provide a containment system for the capture, containment, collection, storage and disposal of the waste materials generated by the work under this Section, to meet the requirements of [SSPC Guide 6](#), Class [1][2][3]. Vapor concentrations shall be kept at or below 10 percent of Lower Explosive Limit (LEL) at all times. Containment may be designed as fixed containment for complete structure or portable containment for sections of structure, however, containment shall remain in any one place from beginning of abrasive blasting through initial cure of coating. Waste materials covered by this paragraph shall not include any material or residue from removal of coatings containing lead, chromium, cadmium, PCB, or any other hazardous material.

It is the Contractors responsibility to insure the feasibility and workability of the containment system. The Contractor shall perform his operations and work schedule in a manner as to minimize leakage of the containment system. The containment system shall be properly maintained and shall not deviate from the approved drawings. If the containment system fails to function satisfactorily, the Contractor shall suspend all operations, except those required to minimize adverse impact on the environment or government property. Operations shall not resume until modifications have been made to correct the cause of the failure.

#### 3.5.2 Automated Monitoring Requirements

Not Applicable

### 3.6 SURFACE PREPARATION

#### 3.6.1 Abrasive Blasting Equipment

Use abrasive blasting equipment of conventional air, force-feed, or pressure type. Maintain a minimum pressure of [85 psig](#) at nozzle. Confirm that air supply for abrasive blasting is free of oil and moisture when tested in accordance with [ASTM D4285](#). Test air quality at each startup, but in no case less often than every five operating hours.

#### 3.6.2 Operational Evaluation of Abrasive

Test abrasive for salt contamination and oil contamination as required by the appropriate abrasive specification daily at startup and every five operating hours thereafter.

#### 3.6.3 Surface Standard

Inspect surfaces to be coated, and select plate with similar properties and surface characteristics for use as a surface standard. Blast clean one or more [1 foot](#) square steel panels as specified in paragraph SURFACE PREPARATION. Record blast nozzle type and size, air pressure at nozzle and compressor, distance of nozzle from panel, and angle of blast to establish procedures for blast cleaning. Measure surface profile in accordance with [ASTM D7127](#). When the surface standard complies with all specified requirements, seal with a clearcoat protectant. Use the surface standard for comparison to abrasive blasted surfaces throughout the course of work.

### 3.6.4 Pre-Preparation Testing for Surface Contamination

Perform testing, abrasive blasting, and testing in the prescribed order.

#### 3.6.4.1 Pre-Preparation Testing for Oil and Grease Contamination

Inspect all surfaces for oil and/or grease contamination using two or more of the following inspection techniques: 1) Visual inspection, 2) WATER BREAK TEST, 3) CLOTH RUB TEST. Reject oil and/or grease contaminated surfaces, clean [using a water based pH neutral degreaser ]in accordance with [SSPC SP 1](#), and recheck for contamination until surfaces are free of oil and grease.

WATER BREAK TEST - Spray atomized mist of distilled water onto surface, and observe for water beading. If water "wets" surface rather than beading up, surface can be considered free of oil or grease contamination. Beading of water (water forms droplets) is evidence of oil or grease contamination.

CLOTH RUB TEST - Rub a clean, white, lint free, cotton cloth onto surface and observe for discoloration. To confirm oil or grease contamination in lightly stained areas, a non-staining solvent may be used to aid in oil or grease extraction. Any visible discoloration is evidence of oil or grease contamination.

#### 3.6.4.2 Pre-Preparation Testing for Soluble Salts Contamination

Test surfaces for soluble salts, and wash as required, prior to abrasive blasting. Soluble salt testing is also required in paragraph PRE-APPLICATION TESTING FOR SOLUBLE SALTS CONTAMINATION as a final acceptance test of prepared surfaces after abrasive blasting, and successful completion of this phase does not negate that requirement. This phase is recommended since pre-preparation testing and washing are generally more advantageous than attempting to remove soluble salt contamination after abrasive blasting. Effective removal of soluble salts will require removal of any barrier to the steel surface, including rust. This procedure may necessitate combinations of wet abrasive blasting, high pressure water rinsing, and cleaning using a solution of water washing and soluble salts remover. The soluble salts remover shall be acidic, biodegradable, nontoxic, noncorrosive, and after application, will not interfere with primer adhesion. Delays between testing and preparation, or testing and coating application, may allow for the formation of new contamination. Use potable water, or potable water modified with soluble salt remover, for all washing or wet abrasive blasting. Test methods and equipment used in this phase are selected at the Contractor's discretion.

### 3.6.5 Abrasive Blasting

Abrasive blast steel surfaces to near-white metal in accordance with [SSPC SP 10/NACE No. 2](#). Prepared surfaces shall conform to [SSPC VIS 1](#) and shall match the prepared test-panels. Provide a [2 to 3 mil](#) surface profile. Reject profile greater than [3 mils](#), discontinue abrasive blasting, and modify processes and materials to provide the specified profile. Measure surface profile in accordance with [ASTM D7127](#), using Rmax as the measure of profile height. Record all measurements required in this standard. Measure profile at rate of three test areas for the first [1000 square feet](#) plus one test area for each additional [1000 square feet](#) or part thereof. When surfaces are reblasted for any reason, retest

profile as specified. Following abrasive blasting, remove dust and debris by vacuum cleaning. Do not attempt to wipe surface clean.

#### 3.6.6 Disposal of Used Abrasive

Dispose of used abrasive off Government property in accordance with Federal, State, and Local mandated regulations.

#### 3.6.7 Pre-Application Testing For Surface Contamination

##### 3.6.7.1 Pre-Application Testing for Oil and Grease Contamination

Ensure surfaces are free of contamination as described in paragraph PRE-PREPARATION TESTING FOR OIL AND GREASE CONTAMINATION, except that only questionable areas need be checked for beading of water misted onto surface.

##### 3.6.7.2 Pre-Application Testing for Soluble Salts Contamination

Test surfaces for chloride contamination using the Test Kit described in TEST KIT FOR MEASURING CHLORIDE, SULFATE AND NITRATE IONS ON STEEL AND COATED SURFACES. Test all surfaces at rate of three tests for the first 1000 square feet plus one test for each additional 2000 square feet or part thereof. Concentrate testing of bare steel at areas of coating failure to bare steel and areas of corrosion pitting. One or more readings greater than 3 micrograms per square centimeter of chlorides or 10 micrograms per square centimeter of sulfates or 5 micrograms per square centimeter of nitrates is evidence of soluble salt contamination. Reject contaminated surfaces, wash as discussed in paragraph PRE-PREPARATION TESTING FOR SOLUBLE SALTS CONTAMINATION, allow to dry, and re-test until all required tests show allowable results. Reblast tested and cleaned areas as required. Label all test tubes and retain for test verification.

##### 3.6.7.3 Pre-Application Testing for Surface Cleanliness

Apply coatings to dust free surfaces. To test surfaces, apply strip of clear adhesive tape to surface and rub onto surface with finger. When removed, the tape should show little or no dust, blast abrasive, or other contaminant. Reject contaminated surfaces and retest. Test surfaces at rate of three tests for the first 1000 square feet plus one test for each additional 1000 square feet or part thereof. Provide two additional tests for each failed test or questionable test. Attach test tapes to Daily Inspection Reports.

#### 3.7 MIXING AND APPLICATION OF SEALANT AND COATING SYSTEM

##### 3.7.1 Preparation of Sealant and Coating Materials for Application

Each of the sealant, primer, intermediate, and topcoat materials is a two-component material supplied in separate containers.

##### 3.7.1.1 Mixing Sealant, Primer and Intermediate Coat Materials

Mix in accordance with manufacturer's instructions, which may differ for each product. Do not mix partial kits, or alter mix ratios. Mix materials in same temperature and humidity conditions specified in paragraph DELIVERY AND STORAGE. Allow mixed material to stand for the required induction time based on its temperature.

### 3.7.1.2 Mixing Topcoat Material

Do not mix partial kits, or alter mix ratios. Mix polyurethane coating materials in same temperature conditions specified in paragraph DELIVERY AND STORAGE. The polyurethane coating material is moisture sensitive and any introduction of moisture or water into the material during mixing or application will shorten usable pot life. Use a mixer that does not create a vortex. Do not add solvent without specific written recommendation from the manufacturer. No induction time is required, only thorough agitation of the mixed material.

### 3.7.1.3 Pot Life

Apply mixed products within stated pot life for each product. Stop applying when material becomes difficult to apply in a smooth, uniform wet film. Add all required solvent at time of mixing. Do not add solvent to extend pot life. Pot life is based on standard conditions at 70 degrees F and 50 percent relative humidity. For every 18 degrees F rise in temperature, pot life is reduced by approximately half, and for every 18 degrees F drop it is approximately doubled. Usable pot life depends on the temperature of the material at the time of mixing and the sustained temperature at the time of application. Other factors such as the shape of the container and volume of mixed material may also affect pot life. Precooling or exterior icing of components for at least 24 hours to a minimum of 50 degrees F in hot climates will extend pot life. High humidity at time of mixing and application shortens pot life of the Polyurethane topcoat material. Following are approximate pot life times:

Sealant	As specified by manufacturer
Epoxy primer and intermediate materials	4 hours
Polyurethane topcoat materials	2 hours.

### 3.7.1.4 Application Conditions and Recoat Windows

The application condition requirements for the coating system are very time and temperature sensitive, and are intended to avoid the delamination problems frequently found on industrial structures. Plan coating application to ensure that specified temperature, humidity, and condensation conditions are met. If conditions do not allow for orderly application of sealant, primer, stripe coat, intermediate coat and topcoat, use appropriate means of controlling air and surface temperatures, as required. Partial or total enclosures, insulation, heating or cooling, or other appropriate measures may be required to control conditions to allow for orderly application of all required coats.

Maintain air and steel surface temperature between 60 and 100 degrees F during application and the first four hours of cure for epoxy coats and the first eight hours of cure for polyurethane coats. Maintain steel surface temperature more than 5 degrees F above the dew-point of the ambient air for the same period.

Use Table entitled "RECOAT WINDOWS" to determine appropriate recoat windows for each coat after the initial coat. Apply each coat during appropriate RECOAT WINDOW of preceding coat. If a RECOAT WINDOW is missed, the minimum and maximum primer and intermediate coat thickness may be adjusted to accommodate a FILL COAT, however, requirements for total epoxy coating thickness and total coating thickness will not be modified. Missing more than one RECOAT WINDOW may require complete removal of coating if maximum total coating thickness requirements cannot be achieved.

If coating is not applied during RECOAT WINDOW, or if surface temperature exceeds 120 degrees F between applications, provide GLOSS REMOVAL, apply next coat within 24 hours. If next planned coat is topcoat, apply FILL COAT if required to fill sanding marks. Sanding marks from GLOSS REMOVAL of intermediate coat reflecting through topcoat will be considered as noncompliant. Apply FILL COAT within 24 hours of GLOSS REMOVAL, then apply topcoat within RECOAT WINDOW of FILL COAT.

RECOAT WINDOWS						
<u>EPOXY OVER EPOXY</u>						
Temperature degrees F	60-70	71-80	12-36	91-100	101-110	111-120
RECOAT WINDOW (Hrs.)	24-72	18-60	16-48	12-36	8-18	4-6
<u>POLYURETHANE OVER EPOXY</u>						
Temperature degrees F	60-70	71-80	12-36	91-100	101-110	111-120
RECOAT WINDOW (Hrs.)	24-96	24-72	16-48	12-36	10-24	8-16
<u>POLYURETHANE OVER POLYURETHANE</u>						
Temperature degrees F	60-70	71-80	12-36	91-100	101-110	111-120
RECOAT WINDOW (Hrs.)	8-48	6-48	4-36	3-24	2-12	1-2

The temperature ranges shown in the table above are for determining recoat windows. Choose recoat window based on the highest surface temperature that was sustained for one or more hours between coats. This applies to

the entire time between coats. Measure and record air and surface temperatures on hourly basis to determine appropriate recoat windows. If surface temperature goes above 100 degrees F, measure and record temperatures every half hour.

FILL COAT - Where indicated, apply coat of intermediate coat epoxy, at 2 to 3 mils DFT, then apply next specified full coat within recoat window of FILL COAT. A FILL COAT may be used to adjust coating thickness to comply with requirements or to fill sanding marks in intermediate coat.

GLOSS REMOVAL - Where required, hand sand in a linear fashion to remove gloss using 120-200 grit wet/dry sandpaper, followed by solvent wiping with a clean rag soaked with denatured alcohol to remove all dust. GLOSS REMOVAL of primer coat is to scarify surface and shall consist of removal of approximately 1 mil of coating. If steel is exposed during GLOSS REMOVAL, repair in accordance with paragraph PROCEDURE FOR HOLIDAY AND SPOT REPAIRS OF NEWLY APPLIED COATING. GLOSS REMOVAL of intermediate coat may include removal of up to 3 mils of coating to avoid excess thickness, prior to application of FILL COAT.

### 3.7.2 Amine Blush Testing of Epoxy Coat Prior to Overcoating

Test epoxy surfaces prior to application of roof joint sealant, epoxy coat, or polyurethane topcoat for amine blush contamination using the Test Kit described in paragraph TEST KIT FOR IDENTIFYING AMINE BLUSH ON EPOXY SURFACES. Test all surfaces at rate of three tests for the first 1000 square feet plus one test for each additional 2000 square feet or part thereof. Remove any identified contamination using an approved procedure.

### 3.7.3 Application of Coating System and Joint Sealant

Apply coatings in accordance with SSPC PA 1 and as specified herein. Apply coatings to surfaces that meet all stated surface preparation requirements.

After application of primer coat and prior to application of each subsequent coat, perform testing prescribed in paragraph PRE-APPLICATION TESTING FOR SURFACE CONTAMINATION, as necessary, to ensure minimal intercoat contamination. This testing may be reduced to one half of the prescribed rate for bare steel if the testing indicates no contamination when sampling is evenly distributed over surfaces being tested. If contamination is found between coats, revert to the specified testing rate. Generally, oil and grease contamination and soluble salts contamination are not encountered if subsequent coats are applied within specified recoat windows and unusual atmospheric events do not occur. Such atmospheric events as a coastal storm blowing onshore can bring unusual chloride contamination. Concern for intercoat contamination should be continually prevalent, and spot testing should be accomplished to verify satisfactory conditions. Where visual examination or spot testing indicates contamination, perform sufficient testing to verify non-contamination, or to define extent of contamination for appropriate treatment.

Apply each coat in a consistent wet film, at 90 degrees to previous coat. Ensure that primer and intermediate coat "cold joints" are no less than six inches from welds. Apply stripe coat by brush. For convenience, stripe coat material may be delivered by spray if followed immediately with brush-out and approved procedures include appropriate controls on thickness. Apply all other coats by spray application. Use appropriate

controls to prevent airborne coating fog from drifting beyond[ [15][\_\_\_\_\_] feet from the structure perimeter] [the tank berm]. Cover or protect all surfaces that will not be coated. The cleanliness, temperature, recoat windows, and airborne paint containment requirements may necessitate the use of enclosures, portable shelters, or other appropriate controls.

Apply coatings at the following specified thickness:

Coat	Minimum DFT (Mils)	Maximum DFT (Mils)
Primer	3	5
Intermediate	3	5
Top	2	3
Total system	8	13

#### 3.7.3.1 Application of Primer

Apply primer coat, maintaining paint supply container height within 3 feet of the paint nozzle for applying zinc primer. Maintain constant agitation of paint pot to ensure that zinc does not settle in container.

#### 3.7.3.2 Application of Stripe Coat

Apply a stripe coat of intermediate coat epoxy material within RECOAT WINDOW of primer, allowing sufficient dry time to allow application of intermediate coat within RECOAT WINDOW of primer. Apply by brush, working material into corners, crevices, angles, and welds, and onto outside corners and angles.

#### 3.7.3.3 Application of Intermediate Coat

Apply intermediate coat within RECOAT WINDOW of primer coat.

#### 3.7.3.4 Non-skid for Stairs and Top

Where non-skid is required, apply a second intermediate coat, and immediately follow with application of non-skid grit, broadcast at the rate of 2 pounds per 100 square feet, and backroll. Apply topcoat as specified.

#### 3.7.3.5 Application of Topcoat

Make all required repairs to primer and intermediate coats as specified in paragraph entitled "Procedure for Holiday and Spot Repairs of Newly Applied Coating" prior to applying topcoat. Apply topcoat within RECOAT WINDOW of intermediate coat. The polyurethane topcoat may require multiple passes to achieve desired aesthetics and required thickness. Consult manufacturer for thinning and application procedures for anticipated temperature, humidity, and wind conditions. Touch-up blemishes and defects within recoat window of polyurethane topcoat. Retain sample of polyurethane topcoat, from the same batch used to coat structure, to make touch-ups that might be required later.

### 3.7.3.6 Application of Joint Sealant

Apply joint sealant to back-to-back steel joints that are less than 3/8 inches wide and are not seal welded. Apply sealant to top and bottom, or each side, of narrow joints. Apply sealant within 48 hours of application of the topcoat, and touch-up with topcoat after appropriate cure of the sealant.

### 3.7.3.7 Procedure for Holiday and Spot Repairs of Newly Applied Coating

Repair coating film defects at the earliest practicable time, preferably before application of the succeeding coat. Observe all requirements for soluble salts contamination, cleanliness between coats, and application conditions. Prepare defective area in accordance with SSPC SP 10/NACE No. 2, and feather coating as required to leave 4 inches of each succeeding coat feathered and abraded. Protect adjacent areas from damage and overspray. Remove dust and solvent wipe the prepared area plus an additional 4 inches beyond the prepared area with clean denatured alcohol. Apply each coat within RECOAT WINDOW of preceding coat. Within four hours of preparation, apply zinc-rich primer to prepared steel and feather onto prepared primer. Apply intermediate coat to primed area and feather to prepared intermediate area. Apply topcoat to intermediate coat and feather to prepared topcoat. Apply each repair coat to approximate thickness of surrounding coating system.

### 3.7.3.8 Structure Occupancy After Coating Application

Use clean canvas or other approved shoe covers when walking on coated surfaces, regardless of curing time allowed. For heavily trafficked areas, provide cushioned mats for additional protection.

## 3.8 PROJECT IDENTIFICATION

Not Applicable

## 3.9 FIELD QUALITY CONTROL

Not Applicable

### 3.9.1 Coating Inspector

The coating inspector shall be considered a QC Specialist and shall report to the QC Manager, as specified in Section 01 45 00.00 10 QUALITY CONTROL. The Coating Inspector shall be present during all pre-preparation testing, surface preparation, coating application, initial cure of the coating system, during all coating repair work, and during completion activities as specified in Section 01 45 00.00 10 QUALITY CONTROL. The Coating Inspector shall provide complete documentation of conditions and occurrences on the job site, and be aware of conditions and occurrences that are potentially detrimental to the coating system. The requirements for inspection listed in this Section are in addition to the QC inspection and reporting requirements specified in Section 01 45 00.00 10 QUALITY CONTROL.

### 3.9.2 Field Inspection

#### 3.9.2.1 Inspection Requirements

Perform field inspection in accordance with ASTM D3276 and the approved

Coating Work Plan. Document Contractor's compliance with the approved Coating Work Plan.

Provide all tools and instruments required to perform the required testing, as well as any tools or instruments that the inspector considers necessary to perform the required inspections and tests. Document each inspection and test, including required hold points and other required inspections and tests, as well as those inspections and tests deemed prudent from on-site evaluation to document a particular process or condition, as follows:

- a. Location or area;
- b. Purpose (required or special);
- c. Method;
- d. Criteria for evaluation;
- e. Results;
- f. Determination of compliance;
- g. List of required rework;
- h. Observations.

Collect and record Environmental Conditions as described in [ASTM D3276](#) on a 24 hour basis, as follows:

- a. During surface preparation, every two hours or when changes occur;
- b. During coating application and the first four days of initial cure, every hour, or when changes occur;
- c. Note location, time, and temperature of the highest and lowest surface temperatures each day;
- d. Use a non-contact thermometer to locate temperature extremes, then verify with contact thermometers.

Document all equipment used in inspections and testing, including manufacturer, model number, serial number, last calibration date and future calibration date, and results of on-site calibration performed.

Document Contractors compliance with the approved Coating Work Plan.

#### 3.9.2.2 [Inspection Report Forms](#)

Develop project-specific report forms as required to report measurements, test results, and observations being complete and conforming to contract requirements. This includes all direct requirements of the contract documents and indirect requirements of referenced documents. Show acceptance criteria with each requirement and indication of conformity of each inspected item. The data may be in any format, but must be legible and presented so that entered data can be quickly compared to the appropriate requirement.

#### 3.9.2.3 [Daily Inspection Reports](#)

Submit one copy of daily inspection report completed each day when performing work under this Section, to the Contracting Officer. Note all non-compliance issues, and all issues that were reported for rework in accordance with QC procedures of Section [01 45 00.00 10](#) QUALITY CONTROL. Each report shall be signed by the coating inspector and the QC Manager. Submit report within 24 hours of date recorded on the report.

## 3.9.2.4 Inspection Logbook

A continuous record of all activity related to this Section shall be maintained in an Inspection Logbook on a daily basis. The logbook shall be hard or spiral bound with consecutively numbered pages, and shall be used to record all information provided in the Daily Inspection Reports, as well as other pertinent observations and information. The Coating Inspector's Logbook that is sold by NACE is satisfactory. Submit the original Inspection Logbook to the Contracting Officer upon completion of the project and prior to final payment.

## 3.9.2.5 Inspection Equipment

All equipment shall be in good condition, operational within its design range, and calibrated as required by the specified standard for use of each device.

## 3.10 FINAL CLEANUP

Following completion of the work, remove debris, equipment, and materials from the site. Remove temporary connections to Government or Contractor furnished water and electrical services. Restore existing facilities in and around the work areas to their original condition.

TABLE 1						
COATING QUALITY CONFORMANCE INSPECTION REQUIREMENTS						
Table Ia - Zinc-rich Epoxy Primer Coat <a href="#">MIL-DTL-24441/19</a> Formula 159						
Test	Component A		Component B		Mixed	
	Min.	Max.	Min.	Max.	Min.	Max.
Pigment content, percent (zinc dust)	---	---	81.5	85.5	---	---
Volatiles, percent	42.8	44.3	8.0	8.4	---	---
Non-volatile vehicle percent	53.7	57.7	8.3	8.7	---	---
Weight, Kilograms/liter	0.87	1.01	3.30	3.40	2.80	2.91
Weight, Pounds/gallon	7.3	8.4	27.5	28.4	23.4	24.4
Flashpoint, Degrees C	35.6	---	37.8	---	---	---
Flashpoint, Degrees F	96	---	100	---	---	---

TABLE 1						
COATING QUALITY CONFORMANCE INSPECTION REQUIREMENTS						
Table Ia - Zinc-rich Epoxy Primer Coat <a href="#">MIL-DTL-24441/19</a> Formula 159						
<u>Test</u>	<u>Component A</u>		<u>Component B</u>		<u>Mixed</u>	
	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>
Consistency, grams	---	---	250	500	150	300
Set to touch time, hours at 23 degrees C, 73 degrees F	---	---	---	---	---	2
Dry hard time, hours at 23 degrees C, 73 degrees F	---	---	---	---	---	8
Pot life, hours at 23 degrees C, 73 degrees F	---	---	---	---	4	---
Sag resistance, Micrometers	---	---	---	---	300	---
Sag resistance, Mils	---	---	---	---	12	---
VOC, Grams/liter	---	---	---	---	---	304
VOC, Pounds/gallon	---	---	---	---	---	2.5
NOTES: Test methods as specified in <a href="#">MIL-DTL-24441</a> .						

TABLE 1						
COATING QUALITY CONFORMANCE INSPECTION REQUIREMENTS						
Table Ib. - Epoxy Intermediate Coat MIL-DTL-24441/31 Formula 152 Type IV (White (Tinted))						
Test	Component A		Component B		Mixed	
	Min.	Max.	Min.	Max.	Min.	Max.
Pigment content, percent	44.0	49.0	33.0	38.0	---	---
Volatiles, percent	29.0	35.0	16.0	21.0	---	---
Non-volatile vehicle percent	17.5	23.5	44.0	49.0	---	---
Coarse particles, percent	---	0.3	---	0.3	---	---
Consistency, grams	180	320	300	470	180	245
Weight, Kilograms/liter	1.39	1.45	1.29	1.35	1.34	1.4
Weight, Pounds/gallon	11.6	12.1	10.8	11.3	11.2	11.7
Set to touch time, hours at 23 degrees C, 73 degrees F	---	---	---	---	---	3
Dry hard time, hours at 23 degrees C, 73 degrees F	---	---	---	---	---	8
Fineness of grind, Hegman	4	---	4	---	---	---
Flashpoint, Degrees C	35.5	---	37.8	---	---	---
Flashpoint, Degrees F	96	---	100	---	---	---
Titanium dioxide, percent of pigment	91	---	---	---	---	---
Pot life, hours at 23 degrees C, 73 degrees F	---	---	---	---	4	---
Sag resistance, Micrometers	---	---	---	---	300	---
Sag resistance, Mils	---	---	---	---	12	---

TABLE 1						
COATING QUALITY CONFORMANCE INSPECTION REQUIREMENTS						
Table Ib. - Epoxy Intermediate Coat <u>MIL-DTL-24441/31</u> Formula 152 Type IV (White (Tinted))						
<u>Test</u>	<u>Component A</u>		<u>Component B</u>		<u>Mixed</u>	
	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>
Color of dry film to approximate color of <u>FED-STD-595</u> color 27778	---	---	---	---	---	Conform
Contrast ratio, at 75 micrometers, 3 mils DFT	---	---	---	---	.098	---
Gloss, 60 degree specular	---	---	---	---	35	---
VOC, Grams/liter	---	---	---	---	---	340
VOC, Pounds/gallon	---	---	---	---	---	2.8
GENERAL NOTES: Test methods as specified in <u>MIL-DTL-24441</u> . Where "Conform" is indicated, refer to specific requirements of <u>MIL-DTL-24441/31</u> .						

TABLE I						
COATING QUALITY CONFORMANCE INSPECTION REQUIREMENTS						
Table Ic - Polyurethane Topcoat <u>MIL-PRF-85285</u> Type II (White and Colors)						
<u>Test</u>	<u>Component A</u>		<u>Component B</u>		<u>Mixed</u>	
	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>
Moisture content, percent	---	2	---	---	---	---
Course particles, percent	---	---	---	---	---	.5
Viscosity	---	---	---	---	---	See Note 1
Fineness of grind, Hegman	---	---	---	---	7	---

TABLE I						
COATING QUALITY CONFORMANCE INSPECTION REQUIREMENTS						
Table Ic - Polyurethane TopcoatMIL-PRF-85285 Type II (White and Colors)						
Test	Componenent A		Component B		Mixed	
	Min.	Max.	Min.	Max.	Min.	Max.
Drying to touch (See Note 2)	---	---	---	---	---	4
Dry-hard (See Note 2)	---	---	---	---	---	8
VOC, grams per liter	---	---	---	---	---	340
Color	---	---	---	---	delta E+-1.0	
Gloss 60 degree specular gloss						
Gloss	---	---	---	---	---	90
Semi-gloss	---	---	---	---	15	45
Opacity	---	---	---	---	0.95	---
Flexibility	---	---	---	---	---	Conform
Fluid resistance	---	---	---	---	---	Conform
Heat resistance (cure)	---	---	---	---	---	Conform
Solvent resistance (cure)	---	---	---	---	---	Conform
Condition in container	---	---	---	---	---	Conform
Odor	---	---	---	---	---	Conform
Lead percent	---	---	---	---	---	0.06
Cadmium percent	---	---	---	---	---	0.06
Chromium percent	---	---	---	---	---	0.00
NOTES: (1) Modify paragraph 3.6.4 Viscosity and Pot Life, of MIL-PRF-85285 as follows:  The viscosity of the admixed coating, when tested in accordance with ASTM D1200 through a No. 4 Ford cup, shall be as follows:						

TABLE I						
COATING QUALITY CONFORMANCE INSPECTION REQUIREMENTS						
Table Ic - Polyurethane TopcoatMIL-PRF-85285 Type II (White and Colors)						
Test	Componenent A		Component B		Mixed	
	Min.	Max.	Min.	Max.	Min.	Max.
Time from mix (minimum)			Maximum time through a No. 4 Ford Cup			
Initially			30 seconds			
2 hours			60 seconds			
4 hours			No gel			
(2) Modify paragraph 3.7.1 Drying Time, of MIL-PRF-85285. When applied by spray techniques and when tested in accordance with ASTM D1640/D1640M, the coating shall be set-to-touch within four hours and dry-hard within eight hours (see 4.6 and table I).						
GENERAL NOTES: Test methods as specified in MIL-PRF-85285, except those marked with "*". Where "Conform" is indicated, refer to specific requirements of MIL-PRF-85285.						

-- End of Section --

SECTION 31 23 00.00 20

EXCAVATION AND FILL

02/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1140	(2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> ) (2700 kN-m/m <sup>3</sup> )
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	(2017) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846.3-3	(1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods
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## 1.2 DEFINITIONS

### 1.2.1 Capillary Water Barrier

Not Applicable.

### 1.2.2 Degree of Compaction

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in [ASTM D698][ASTM D1557], for general soil types, abbreviated as percent laboratory maximum density.

### 1.2.3 Hard Materials

Not Applicable.

### 1.2.4 Rock

Not Applicable.

### 1.2.5 Pile Supported Structure

Not Applicable.

## 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

SD-06 Test Reports

Fill and backfill test

Select material test

Porous fill test for capillary water barrier

Density tests

Moisture Content Tests

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

## 1.4 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

## 1.5 CRITERIA FOR BIDDING

Base bids on the following criteria:

- a. Surface elevations are as indicated.
- b. Pipes or other artificial obstructions, except those indicated, will not be encountered.
- [ c. Ground water elevations indicated by the boring log were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction.
- ]d. Ground water elevation is 13 to 17 feet below existing surface elevation at the time of geotechnical investigations.
- ]e. Material character is indicated by the boring logs.
- ]

## 1.6 REQUIREMENTS FOR OFF SITE SOIL

Soils brought in from off site for use as backfill shall be tested for petroleum hydrocarbons, BTEX, PCBs and HW characteristics (including toxicity, ignitability, corrosivity, and reactivity). Backfill shall not contain concentrations of these analytes above the appropriate State and/or EPA criteria, and shall pass the tests for HW characteristics. Determine petroleum hydrocarbon concentrations by using appropriate State protocols. Determine BTEX concentrations by using EPA SW-846.3-3 Method 5035/8260B. Perform complete TCLP in accordance with EPA SW-846.3-3 Method 1311. Perform HW characteristic tests for ignitability, corrosivity, and reactivity in accordance with accepted standard methods. Perform PCB testing in accordance with accepted standard methods for sampling and analysis of bulk solid samples. Provide borrow site testing for petroleum hydrocarbons and BTEX from a grab sample of material from the area most likely to be contaminated at the borrow site (as indicated by visual or olfactory evidence), with at least one test from each borrow site. For each borrow site, provide borrow site testing for HW characteristics from a composite sample of material, collected in accordance with standard soil sampling techniques. Do not bring material onsite until tests results have been received and approved by the Contracting Officer.

## 1.7 QUALITY ASSURANCE

## 1.7.1 Utilities

Not Applicable.

## PART 2 PRODUCTS

## 2.1 SOIL MATERIALS

## [2.1.1 Satisfactory Materials

Any materials classified by [ASTM D2487](#) as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, [SM,] [SW-SM,] [SC,] [SW-SC,] [SP-SM,] [SP-SC,] [CL,] [ML,] [CL-ML,] [CH,] [MH] free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and [frozen,] deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

## ][2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than [3 inches](#). The Contracting Officer shall be notified of any contaminated materials.

## ][2.1.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in [ASTM D2487](#) as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM, GP-GM, GW-GM, SW-SM, SP-SM, and SM shall be identified as cohesionless only when the fines are nonplastic (plasticity index equals zero). Materials classified as GM and SM will be identified as cohesive only when the fines have a plasticity index greater than zero.

## ][2.1.4 Common Fill

Approved, unclassified soil material with the characteristics required to compact to the soil density specified for the intended location.

## 2.1.5 Backfill and Fill Material

[ASTM D2487](#), classification GW, GP, GM, [GC,] SW, SP, SM, [SC] with a maximum [ASTM D4318](#) liquid limit of 35, maximum [ASTM D4318](#) plasticity index of 12, and a maximum of 25 percent by weight passing [ASTM D1140](#), No. 200 sieve.

## 2.1.6 Select Material

Provide materials classified as [GW,] [GP,] [SW,] [SP,] or by [ASTM D2487](#) where indicated. [The liquid limit of such material shall not exceed 35 percent when tested in accordance with [ASTM D4318](#). The plasticity index shall not be greater than 12 percent when tested in accordance with [ASTM D4318](#), and not more than 35 percent by weight shall be finer than No. 200 sieve when tested in accordance with [ASTM D1140](#).

[Bearing Ratio: At [0.1 inch](#) penetration, the bearing ratio shall be [\_\_\_\_\_] percent at 95 percent [ASTM D1557](#) maximum density as determined in accordance with [ASTM D1883](#) for a laboratory soaking period of not less than 4 days. [Maximum expansion shall be [\_\_\_\_\_] percent.] [The combined material shall conform to the following sieve analysis:]] [Backfill material size shall be as indicated on the drawings and not smaller than the sizes as follows](#)

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
2 1/2 inches	100
No. 4	40
No. 10	20
No. 40	10
No. 200	5

#### 2.1.7 Topsoil

[ Provide as specified in Section 32 92 19SEEDING.

]Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

#### ]2.2 POROUS FILL FOR CAPILLARY WATER BARRIER

Not Applicable

#### 2.3 UTILITY BEDDING MATERIAL

Not Applicable.

##### [2.3.1 Sand

Not Applicable.

##### ]2.3.2 Gravel

Not Applicable.

#### ]2.4 SEWAGE ABSORPTION TRENCHES OR PITS

##### 2.4.1 Porous Fill

Not Applicable.

##### 2.4.2 Cover

Not Applicable.

]2.5 BORROW

Not Applicable.

2.6 FILTER FABRIC

Not Applicable.2.7 MATERIAL FOR RIP-RAP

Not Applicable.

2.8 BURIED WARNING AND IDENTIFICATION TAPE

Not Applicable.

2.9 DETECTION WIRE FOR NON-METALLIC PIPING

Not Applicable.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Shoring and Sheeting

Not Applicable.

3.1.2 Drainage and Dewatering

Not Applicable.

3.1.2.1 Drainage

Not Applicable.

3.1.2.2 Dewatering

Not Applicable.

3.1.3 Underground Utilities

Not Applicable.

3.1.4 Machinery and Equipment

Not Applicable.

3.2 SURFACE PREPARATION

3.2.1 Clearing and Grubbing

Unless indicated otherwise, remove trees, stumps, logs, shrubs, brush and vegetation and other items that would interfere with construction operations within the clearing limits. Remove stumps entirely. Grub out matted roots and roots over 2 inches in diameter to at least 18 inches below existing surface.

3.2.2 Stripping

Not Applicable.

### 3.2.3 Unsuitable Material

Remove vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish underneath paved areas or concrete slabs.

## 3.3 EXCAVATION

Excavate to contours, elevation, and dimensions indicated. RKeep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be [removed as directed]. Refill with backfill and fill material as indicated on the drawings and compact to the percent of maximum density as shown on the construction drawings[ASTM D698] [ASTM D1557]. Unless specified otherwise, refill excavations cut below indicated depth with [backfill and fill material] [satisfactory material] [select material] [porous fill] and compact to [95] [\_\_\_\_\_] percent of [ASTM D698] [ASTM D1557] maximum density. Satisfactory material removed below the depths indicated, without specific direction of the Contracting Officer, shall be replaced with satisfactory materials to the indicated excavation grade; except as specified for spread footings. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Contracting Officer.

### 3.3.1 Structures With Spread Footings

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement. Fill over excavations with concrete during foundation placement.

### 3.3.2 Pile Cap Excavation and Backfilling

Not Applicable.

### 3.3.3 Pipe Trenches

Not Applicable.

### 3.3.4 Excavated Materials

Not Applicable.

### 3.3.5 Final Grade of Surfaces to Support Concrete

Not Applicable.

## 3.4 SUBGRADE PREPARATION

Subgrade in this specification refers to the natural soil beneath the engineered (select) material placed under the concrete footing.

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Contracting Officer. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1

vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary [to plus or minus 0.5 percent of optimum moisture] [to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used]. Minimum subgrade density shall be as specified herein.

#### 3.4.1 Proof Rolling

Not Applicable.

#### 3.5 SUBGRADE FILTER FABRIC

Not Applicable.

#### 3.6 FILLING AND BACKFILLING

Fill and backfill to contours, elevations, and dimensions indicated. Compact each lift before placing overlaying lift.

##### 3.6.1 Backfill and Fill Material Placement

Provide under concrete slabs, except where select material is provided. Place in 6 inch lifts. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Do not place over wet or frozen areas. Place backfill material adjacent to structures as the structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against the structure.

##### 3.6.2 Select Material Placement

Provide under [porous fill of] structures not pile supported. Place in 6 inch lifts. Do not place over wet or frozen areas. Backfill adjacent to structures shall be placed as structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against structure.

##### 3.6.3 Porous Fill Placement

Not Applicable.

##### 3.6.4 Trench Backfilling

Not Applicable.

#### 3.7 BORROW

Not Applicable.

3.8 BURIED WARNING AND IDENTIFICATION TAPE

Not Applicable.

3.9 BURIED DETECTION WIRE

Not Applicable.

3.10 COMPACTION

Determine in-place density of existing subgrade; if required density exists, no compaction of existing subgrade will be required. [Density requirements specified herein are for cohesionless materials. When cohesive materials are encountered or used, density requirements may be reduced by 5 percent.]

3.10.1 General Site

Not Applicable.

3.10.2 Structures, Spread Footings, and Concrete Slabs

Compact top 12 inches of subgrades to 95 percent of maximum density. Compact fill and backfill material to 95 percent of [ASTM D1557].

3.10.3 Adjacent Area

Compact areas within 5 feet of structures to 95 percent of [ASTM D698] [ASTM D1557].

3.10.4 Paved Areas

Not Applicable.

3.11 FINISH OPERATIONS

3.11.1 Grading

Finish grades as indicated within one-tenth of one foot. Grade areas to drain water away from structures. Maintain areas free of trash and debris. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.11.2 Topsoil and Seed

Not Applicable.

3.11.3 Protection of Surfaces

Not Applicable.

3.12 DISPOSITION OF SURPLUS MATERIAL

[Waste in Government disposal area [indicated] [which is located within a haul distance of 50 miles.] [Remove from Government property] surplus or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber.]

### 3.13 FIELD QUALITY CONTROL

#### 3.13.1 Sampling

Take the number and size of samples required to perform the following tests.

#### 3.13.2 Testing

Perform one of each of the following tests for each material used. Provide additional tests for each source change.

##### 3.13.2.1 Fill and Backfill Material Testing

Test fill and backfill material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

##### 3.13.2.2 Select Material Testing

Test select material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

##### 3.13.2.3 Porous Fill Testing

Not Applicable.

##### 3.13.2.4 Density Tests

Test density in accordance with ASTM D1556/D1556M, or ASTM D6938. When ASTM D6938 density tests are used, verify density test results by performing an ASTM D1556/D1556M density test at a location already ASTM D6938 tested as specified herein. Perform an ASTM D1556/D1556M density test at the start of the job, and for every 10 ASTM D6938 density tests thereafter. Test each lift at randomly selected locations every 2000 square feet of existing grade in fills for structures and concrete slabs, and every 2500 square feet for other fill areas and every 2000 square feet of subgrade in cut. Include density test results in daily report.

-- End of Section --

## SECTION 31 32 23

## FOUNDATION DRILLING AND GROUTING

08/08

## PART 1 GENERAL

## 1.1 SUMMARY

- a. This section covers drilling exploratory holes; drilling drain holes; drilling, washing and pressure testing grout holes; making grout connections; furnishing, handling, transporting, storing, mixing and injecting the grouting materials; backfilling holes; patching the finished grout holes; care and disposal of drill cuttings, waste water and waste grout; clean up of [grout galleries and shafts][the areas] upon completion of the work and all other such operations as are incidental to the drilling and grouting. The work contemplated consists of [constructing a grout curtain and a drainage curtain][area grouting], the approximate locations, limits, and details which are indicated. Perform Government preconstruction sampling and testing as specified below:
- b. Perform sampling and testing of sand, cementitious materials, and admixtures in accordance with Section [03 70 00 MASS CONCRETE][03 30 00 CAST-IN-PLACE CONCRETE][03 31 01.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE].
- c. Perform sampling and testing of grout materials in accordance with Section [03 70 00 MASS CONCRETE][03 30 00 CAST-IN-PLACE CONCRETE][03 31 01.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE].

## 1.2 UNIT PRICES

## 1.2.1 Mobilization and Demobilization

## 1.2.1.1 Payment

Payment will be made for costs for assembling all plant and equipment at the site, preparatory to initiating the work and for removing it therefrom when the drilling and grouting program has been completed. Sixty (60) percent of the contract lump sum price for mobilization and demobilization will be paid following completion of moving onto the site, including complete assembly, in working order, of all equipment necessary to perform the required drilling and grouting operations. The remaining forty (40) percent of the contract lump sum price will be paid when all equipment has been removed from the site.

## 1.2.1.2 Unit of Measure

Unit of measure: lump sum.

## 1.2.2 Drilling Grout Holes

## 1.2.2.1 Payment

Payment will be made for costs associated with drilling and redrilling grout holes; [washing and pressure testing of grout holes; ]care and

disposal of waste water and waste grout; clean-up of the site; furnishing, handling, transporting and storing of grout materials; and for furnishing all labor and supplies incidental to the work. This price is subject to the cost limitation imposed by[ Section 31 32 23 FOUNDATION DRILLING AND GROUTING,] paragraph PIPE FOR FOUNDATION GROUTING AND DRAINAGE, but only in those locations where pipe is specified. No payment will be made for grout, or the material constituents thereof, wasted due to improper anchorage of grout pipe or connections, or which is wasted due to negligence on the part of the Contractor, nor for grout which is rejected by the Contracting Officer because of improper mixing. Payment will be made at the applicable contract unit prices for materials contained in grout which are wasted, where the wasting is not due to negligence on the part of the Contractor.

#### 1.2.2.2 Measurement

Drilling of grout holes will be measured for payment on the basis of the linear feet of holes actually drilled in concrete or rock, as shown or as directed, including all intermediate holes at locations where pipe was not installed.

#### 1.2.2.3 Unit of Measure

Unit of measure: linear foot.

#### 1.2.3 Drilling Drain Holes

##### 1.2.3.1 Payment

Payment will be made for costs associated with drilling of drain holes actually drilled in concrete or rock, as shown or as directed. This price is subject to the cost limitation imposed by[ Section 31 32 23 FOUNDATION DRILLING AND GROUTING,] paragraph PIPE FOR FOUNDATION GROUTING AND DRAINAGE.

##### 1.2.3.2 Measurement

Drilling of drain holes will be measured for payment on the basis of the linear feet of holes actually drilled in concrete or rock, as shown or as directed.

##### 1.2.3.3 Unit of Measure

Unit of measure: linear foot.

#### 1.2.4 Drilling Exploratory Holes

##### 1.2.4.1 Payment

Payment will be made for costs associated with drilling of exploratory holes.

##### 1.2.4.2 Measurement

Drilling of exploratory holes will be measured for payment on the basis of the linear feet of holes actually drilled in concrete or rock, as directed by the Contracting Officer.

## 1.2.4.3 Unit of Measure

Unit of measure: linear foot.

## [1.2.5 Pressure Washing and Pressure Testing

## [1.2.5.1 Payment

Payment will be made for pressure washing and pressure testing of grout holes, which includes the cost of making and breaking connections incidental to the work. Payment will be based upon the total amount of time required for pressure washing and pressure testing, determined by reducing the total number of minutes of operation to the nearest whole hour. No payment will be made for time lost due to fault or negligence of the Contractor, or due to defective equipment furnished by the Contractor. Time will be measured cumulatively to the next whole minute of operations.

## ][1.2.5.2 Measurement

Pressure washing and pressure testing will be measured for payment on the basis of the actual time water pumps are operating. Pressure washing and pressure testing will be measured from the time pumping is begun on a hole or section of a hole until the time pumping is completed on the hole or section of the hole as determined by the Contracting Officer. Operation time will be determined by rounding 30 or more minutes of operation up to the nearest whole hour, and rounding 29 or less minutes of operation down to the nearest whole hour. Fractional time will be measured cumulatively to the next whole minute of operation.

## ][1.2.5.3 Unit of Measure

Unit of measure: nearest whole hour.

## ]]1.2.6 Steel Pipe and Fittings

## 1.2.6.1 Payment

Payment will be made for costs associated with grout and drain hole pipe and fittings remaining in the permanent work.

## 1.2.6.2 Measurement

Pipe and fittings will be measured for payment on the basis of the actual weight of satisfactorily installed pipe and fittings left in place as shown. No additional allowance will be made because of differences in pipe size or length, or the number of pipes required.

## 1.2.6.3 Unit of Measure

Unit of measure: pound.

## 1.2.7 Portland Cement in Grout

## 1.2.7.1 Payment

Payment will be made for costs associated with Portland cement in grout.

1.2.7.2 Measurement

Portland cement in grout will be measured for payment on the basis of the number of cubic feet (94 pounds) of cement used in the grout satisfactorily placed in grout holes and in exploratory holes, or wasted when such wasting is not due to the Contractor's negligence.

1.2.7.3 Unit of Measure

Unit of measure: cubic foot (94 pounds).

1.2.8 Pozzolans (Fly Ash) in Grout

1.2.8.1 Payment

Payment will be made for costs associated with fly ash in grout.

1.2.8.2 Measurement

Fly ash in grout will be measured for payment on the basis of the number of cubic feet (74 pounds) of fly ash used in the grout satisfactorily placed in grout holes.

1.2.8.3 Unit of Measure

Unit of measure: cubic foot.

1.2.9 Sand in Grout

1.2.9.1 Payment

Payment will be made for costs associated with sand in grout.

1.2.9.2 Measurement

Sand in grout will be measured for payment on the basis of the number of cubic feet of sand[, dry rodded measurement,] used in the grout satisfactorily placed in grout holes or in exploratory holes.

1.2.9.3 Unit of Measure

Unit of measure: cubic foot.

1.2.10 Fluidifier in Grout

1.2.10.1 Payment

Payment will be made for costs associated with fluidifier in grout, including full allowance for the payment by the Contractor of all required royalties.

1.2.10.2 Measurement

Fluidifier in grout will be measured for payment on the basis of the number of pounds of fluidifier used in the grout satisfactorily placed in grout holes.

## 1.2.10.3 Unit of Measure

Unit of measure: pound.

## 1.2.11 Bentonite in Grout

## 1.2.11.1 Payment

Payment will be made for costs associated with bentonite in grout.

## 1.2.11.2 Measurement

Bentonite in grout will be measured for payment on the basis of the number of pounds of bentonite actually used in grout mixtures satisfactorily placed in grout holes.

## 1.2.11.3 Unit of Measure

Unit of measure: pound.

## 1.2.12 Placing Grout

## 1.2.12.1 Payment

Payment will be made for costs associated with satisfactorily placing grout in grout holes[, which includes full compensation for proportioning the mix as directed and mixing and injecting the grout as specified[ in Section 31 32 23 FOUNDATION DRILLING AND GROUTING]. Separate payment will be made for all materials used in grout as provided in unit price pay item(s) "Portland Cement in Grout"[, "Pozzolans (Fly Ash) in Grout", "Sand in Grout", "Fluidifier in Grout", and "Bentonite in Grout"].]. No payment will be made for time lost due to fault or negligence of the Contractor or due to defective equipment furnished by the Contractor.]

## 1.2.12.2 Measurement

Placing grout will be measured for payment on the basis of [the number of cubic feet of materials, satisfactorily placed, exclusive of water [and fluidifier] and regardless of the proportions of the mixes, measured individually as specified in unit price pay items "Portland Cement in Grout", "Pozzolans (Fly Ash) in Grout", and "Sand in Grout".][the actual time grout pumps begin pumping on a hole or portion of hole and continuing until the time pumping is completed on that hole or portion of hole, as determined by the Contracting Officer. Time for satisfactory placement of grout will be determined by rounding 30 or more minutes of placement time up to nearest whole hour, and rounding 29 or less minutes of placement time down to the nearest whole hour. Fractional placement time will be measured cumulatively to the next whole minute of operation.]

## 1.2.12.3 Unit of Measure

Unit of measure: [cubic foot.] [nearest whole hour.]

## [1.2.13 Connections to Grout Holes

## [1.2.13.1 Payment

[Payment will be made for costs associated with connections to grout holes at a rate of [\_\_\_\_\_] dollars per connection. Where stop grouting method

is used [payment for at least one connection will be made for each packer setting in a hole.][Payment for only one connection will be made for each hole regardless of the number of settings.]

#### ][1.2.13.2 Measurement

Connections to grout holes will be measured for payment per connection for each time the grout supply line is connected to a grout hole for the purpose of injecting grout regardless of the number of times connections are made per hole or the amount of grout actually injected.

#### ][1.2.13.3 Unit of Measure

Unit of measure: each.

#### ]]1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

##### ASME INTERNATIONAL (ASME)

ASME B16.3 (2011) Malleable Iron Threaded Fittings, Classes 150 and 300

##### ASTM INTERNATIONAL (ASTM)

ASTM A53/A53M (2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM C136/C136M (2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

ASTM C150/C150M (2017) Standard Specification for Portland Cement

ASTM C618 (2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

ASTM C70 (2013) Standard Test Method for Surface Moisture in Fine Aggregate

ASTM C91/C91M (2012) Standard Specification for Masonry Cement

ASTM C937 (2016) Grout Fluidifier for Preplaced-Aggregate Concrete

##### U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 100 (1975) Method of Sampling Concrete Aggregate and Aggregate Sources, and Selection of Material for Testing

## 1.4 DEFINITIONS

### 1.4.1 Zone

A zone is a predetermined partial depth of curtain. The first zone extends [\_\_\_\_\_] feet downward from [the contact between the concrete and the rock] [the bottom of the cutoff trench] [overburden and the top of rock] overburden and elevation [\_\_\_\_\_]. The second zone extends [\_\_\_\_\_] feet downward from the bottom of the first zone. The third zone extends [\_\_\_\_\_] feet downward from the bottom of the second zone. [Define additional zones as needed]. All grouting in a given zone and section shall be finished before work is started in the next [higher] [lower] zone.

### 1.4.2 Section

A section is a reach along the grout curtain, not more than [\_\_\_\_\_] feet in length in which grouting operations will not be permitted at the same time that drilling is in progress. Insofar as practicable, the grout curtain will be subdivided into sections in a manner which will facilitate the Contractor's operations.

### 1.4.3 Stage

A stage is one complete operational cycle of drilling, cleaning, pressure washing, pressure testing, pressure grouting, and grout cleanout within a zone. The actual depth of a stage depends upon geologic conditions encountered in drilling. It may vary from a fraction to the full depth of the zone, and is marked by the loss or gain of drill water in appreciable amounts.

### 1.4.4 Stop

A stop is a predetermined depth at which the expanding plug or packer is positioned.

### 1.4.5 Split Spacing

Split spacing is the procedure of locating an additional grout hole midway between two previously drilled and grouted holes.

## 1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-03 Product Data

Drilling Equipment  
Grouting Equipment  
Grout Plant; G[, [\_\_\_\_\_]]

## 1.6 DELIVERY, STORAGE, AND HANDLING

Transportation and storage of materials shall be in accordance with section [03 70 00 MASS CONCRETE][03 30 00 CAST-IN-PLACE CONCRETE][03 31 01.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE]. A sufficient quantity of cement shall be stored at or near the site of the work to insure that grouting operations will not be delayed by shortage of cement. In the event the cement is found to contain lumps or foreign matter of a nature and in amounts which, in the opinion of the Contracting Officer, may be deleterious to the grouting operations, screening through a standard 100 mesh screen may be required. No payment will be made for such screening.

## 1.7 PROJECT/SITE CONDITIONS

The program shown and described is based on currently available information. Conditions encountered during construction may require additions or deletions. The grouting program shall not be modified or curtailed as a construction expediency. It is a required part of design and shall not become secondary to any time or scheduling restrictions. Grouting mixes, pressures, injection rate and the sequence in which the holes are drilled and grouted will be determined in the field and shall be as directed.

## PART 2 PRODUCTS

### 2.1 GROUTING MATERIAL

Provide grout composed of water and cement, [pozzolans, admixtures, and fillers]. The grout mixes will be designed by the Contracting Officer and will be varied to meet the characteristics of each hole as determined by conditions encountered. The various materials to be furnished shall conform to the specifications listed in paragraphs below.

#### 2.1.1 Water

[The water used in the grout shall be furnished by the Contractor. It shall be fresh, clean and free from injurious amounts of sewage, oil, acid, alkali, salts, or organic matter.][Water suitable for use in the work will be furnished by the Government. It shall be the responsibility of the Contractor to provide any necessary connections and extensions to the Government supply line shown.]

#### 2.1.2 Cement

Cement used in grout shall conform to the requirements of ASTM C91/C91M and ASTM C150/C150M. The use of bulk cement will be permitted provided the Contractor employs methods of handling, transporting, and storage that are satisfactory to the Contracting Officer, otherwise only cement furnished in cloth or paper bags will be accepted to use in the work. Storage of cement shall be in accordance with paragraph DELIVERY, STORAGE, AND HANDLING.

#### 2.1.3 Pozzolans

Pozzolans shall be fly ash [or other raw or calcined natural pozzolans] conforming to ASTM C618. Sampling will be done by an authorized representative of the Government. All tests will be made by and at the expense of the Government. Pozzolans may be furnished in paper sacks or in bulk. It shall be transported, handled, and stored so as to avoid

damage, waste, or absorption of moisture.

#### 2.1.4 Admixtures

Admixtures shall be added to the grout immediately before or during its mixing and will consist of [accelerators, retarders, water reducers, aluminum powder, and fluidifiers].

#### 2.1.5 Fluidifier

Fluidifier shall be a compound possessing characteristics which will increase the flowability of the mixture, assist in dispersal of the cement grains, and neutralize the setting shrinkage of the grout. The quality of the material shall meet the requirements specified in [ASTM C937](#). Sampling of fluidifier shall be done by an authorized representative of the Contracting Officer. Trial mixtures should be tested prior to using the materials in field work. All tests will be made by and at the expense of the Government. Fluidifier shall be furnished in moisture-resistant paper sacks shipped in sealed containers and shall be handled and stored so as to avoid absorption of moisture, damage or waste. Material which has become caked due to moisture absorption will be rejected.

#### 2.1.6 Bentonite

Bentonite shall be sodium (Na) cation, powdered montmorillonite. It shall be added to the cement grout 2 percent to 5 percent by weight of cement. The percentage shall be adjusted as directed by the Contracting Officer. A separate colloidal bentonite mixer is required to mix the bentonite and water to ensure fully dispensing and hydrating the bentonite before adding to the grout mixer. The bentonite shall be handled and stored so as to avoid absorption of moisture, damage, or waste. Bentonite which has become caked due to moisture absorption will be rejected. A sufficient quantity of bentonite shall be stored at or near the site of the work to insure that grouting operations will not be delayed by shortage of bentonite.

#### 2.1.7 Sand

- a. Sand for grout shall be clean and consist of hard, tough, durable, uncoated particles with no more than [\_\_\_\_\_] percent passing the No. 200 sieve. The shape of the particles shall be generally rounded or cubical [and shall not contain more than [\_\_\_\_\_] percent of flat or elongated pieces having a maximum dimension in excess of five times the minimum dimension]. The sand shall be generally well graded from fine to coarse in accordance with [ASTM C136/C136M](#) with 100 percent passing the [No. 8][\_\_\_\_\_] sieve.
- b. Subject the sand to such tests as are necessary to determine its acceptability. Perform sampling of sand in accordance with the applicable sampling provisions contained in [COE CRD-C 100](#) or as directed. Unless otherwise directed, all test samples shall be taken under the supervision of the Contracting Officer and shall be delivered to a designated point, at the expense of the Contractor, at least [\_\_\_\_\_] days in advance of the time when sand will be required at the site of work. All tests will be made by the Government at its expense. The tests to which the sand will be subjected will include specific gravity, absorption, soundness in magnesium sulfate, petrographic analyses, and any other tests that are necessary to demonstrate that grout of adequate durability can be produced.

- c. The percentage of surface moisture in terms of the saturated surface-dried sand will be determined in accordance with ASTM C70, or other method giving comparable results.
- d. Store sand in such a manner as to avoid the inclusion of any foreign materials in the grout. All sand shall remain in free draining storage for at least 72 hours prior to use.

## 2.2 METAL PIPE AND FITTINGS

Metal pipe and fittings required for constructing grout, drainage and exploratory holes shall be furnished, cut, threaded, and fabricated by the Contractor.

### 2.2.1 Pipe

Pipe will be black steel of the diameter and in the location indicated. The pipe shall conform to ASTM A53/A53M.

### 2.2.2 Fittings

The fittings shall be black, malleable iron in accordance with ASME B16.3.

## PART 3 EXECUTION

### 3.1 EQUIPMENT

The use of internal combustion engines within dam galleries for operation of drilling and grouting equipment will not be permitted. Submit details and data on the drilling and grouting equipment.

#### 3.1.1 General

All drilling [including exploratory hole drilling] and grouting equipment used shall be of a type, capacity and mechanical condition suitable for performing the work, as determined by the Contracting Officer. The power and equipment and the layout thereof shall meet all applicable requirements of local, State, and Federal regulations and codes, both safety and otherwise.

#### 3.1.2 Drilling Equipment

Standard drilling equipment of the rotary [or percussion] type shall be used to perform the drilling as specified in paragraphs GROUT HOLE DRILLING, DRAIN HOLE DRILLING, COMPLETION OF GROUTING AND DRAIN HOLE DRILLING, and EXPLORATORY HOLE DRILLING. Use [water] [air] for removing cuttings from the hole during drilling operations. Air driven drills used in galleries shall be equipped with suitable mufflers. Supplies shall include all bits, drill rods, tools, casing, piping, pumps, water, and power to accomplish the required drilling. All drilling rigs and pumps will be equipped with pressure gages.

#### 3.1.3 Grouting Equipment

The grout plant shall be capable of supplying, mixing, stirring and pumping the grout and additives, to the satisfaction of the Contracting Officer. Submit a detailed plan showing equipment and grout plant layout proposed for mixing and placing grout. The plant shall have a minimum

capacity of [[\_\_\_\_\_] gpm] [[\_\_\_\_\_] cfm] of grout injected at a pressure not greater than [\_\_\_\_\_] psi. It shall be maintained at all times and any grout hole that is lost or damaged due to mechanical failure of equipment or inadequacy of grout supply shall be replaced by another hole, drilled by the Contractor, at its expense. The amount of grouting equipment shall be as necessary to perform the work specified herein. The type to be furnished shall include the following:

- a. A progressive cavity pump capable of passing particles up to a top size of [\_\_\_\_\_] inches, generating pressures up to [\_\_\_\_\_] psi and pumping a maximum of [[\_\_\_\_\_] gpm] [[\_\_\_\_\_] cfm]. In no case will the pump be separated by more than [\_\_\_\_\_] feet of grout line from the header of a hole being grouted. Where grout lines are more than [\_\_\_\_\_] feet long, an additional pump shall be placed in the line within [\_\_\_\_\_] feet of the header.
- b. A [colloidal] [paddle] type grout mixer having a minimum drum capacity of approximately [\_\_\_\_\_] cubic feet with a mix batch of [\_\_\_\_\_] cubic feet. Mixing time shall be approximately [\_\_\_\_\_] seconds per batch.
- c. A separate colloidal mixer for mixing and hydrating bentonite.
- d. A mechanically agitated sump having a minimum capacity of [\_\_\_\_\_] cubic feet.
- e. A circulating grout header with control valves and a pressure gage with protector as shown on the plans. Control valves shall be connected to the return line and header. The header shall be joined directly to the riser pipe at the hole by means of a quick connector union.
- f. A water storage tank or suitable source of clean auxiliary water for use in washing, pressure testing and flushing operations.
- g. A water meter graduated in cubic feet and tenths having a direct reading totalizer and capable of conveniently being set back to zero.
- h. Such valves, packers, pressure gages, pressure hose, supply lines, and small tools as may be necessary to provide a continuous supply of grout at accurately controlled pressures as specified. The inside diameter of the pressure hose and grout supply line shall be not less than [\_\_\_\_\_] inches. An accurately calibrated, high precision pressure gage shall be used to check the accuracy of all gages used in the grouting. Gages shall be checked at least every 24 hours, or more frequently if the Contracting Officer so determines. When defects are found, grouting operations will be stopped until calibration of gages has been obtained.

### 3.2 GROUT, DRAINAGE AND EXPLORATORY HOLES

All holes for grouting, drainage or exploration shall be drilled at the locations, in the direction, angle, and to the depths indicated or as directed by the Contracting Officer. [ A maximum tolerance for deviation in angle and direction shall be [\_\_\_\_\_] ]. The first series of holes to be drilled and grouted shall be at [\_\_\_\_\_] foot intervals and hereinafter are referred to as primary holes. The location of secondary and succeeding series (intermediate) holes shall be determined by the split spacing method as defined in paragraph SPLIT SPACING. The number of grout holes shall be increased, progressively, by the split spacing method as defined

in paragraph SPLIT SPACING. The number of grout holes shall be increased, progressively, by the split spacing method as deemed necessary by the Contracting Officer until the amount of grout used indicates that the foundation is tight. Each hole drilled shall be protected from becoming clogged or obstructed by means of a cap or other suitable device on the collar and any hole that becomes clogged or obstructed due to fault of the Contractor before completion of operations shall be cleaned out in a manner satisfactory to the Contracting Officer or another hole provided by and at the expense of the Contractor. That portion of holes which penetrates concrete of the dam shall be [formed by embedding pipes in the concrete at the time of its placement] [drilled] as specified in paragraph PIPE FOR FOUNDATION GROUTING AND DRAINAGE. Payment will be made for such partial depth of holes at the unit contract price for [Item No. [\_\_\_\_\_] "Steel Pipe and Fittings"], [Item No. [\_\_\_\_\_] "Drilling Grout Holes"], [Item No. [\_\_\_\_\_] "Drilling Drain Holes"], [Item No. [\_\_\_\_\_] "Drilling Exploratory Holes"].

### 3.2.1 Pipe for Foundation Grouting and Drainage

All metal pipe and fittings required for constructing grout, drainage and exploratory holes shall be embedded. The pipe and fittings shall be cleaned thoroughly of all dirt, grease, oil, grout and mortar immediately before embedment. All joints shall be made up snug and the assembly held firmly in position and protected from damage or displacement while the concrete is being placed. Take all necessary precautions to prevent any pipe from becoming clogged or obstructed from any cause and any pipe which becomes clogged shall be cleaned out in a manner satisfactory to the Contracting Officer at the Contractor's expense. The presence of tramp metal such as nails, wire, bolts, nuts and other foreign material in the pipes through which diamond drilled holes are to be drilled shall be considered as obstructions. As an option, substitute percussion or diamond drilled holes through the concrete in lieu of pipe, provided that the method proposed meets with the approval of the Contracting Officer and provided further that such substitution does not result in any increased cost to the Government.

### 3.2.2 Grout Hole Drilling

- a. Drill grout holes with standard rotary [or percussion] drilling equipment. No core recovery will be required and the type bit used shall be optional with the Contractor. [The hole shall be of sufficient diameter to allow use of an expansion plug or packer with an effective inside diameter of not less than 1/2 inch]. The minimum diameter of hole shall be [1 3/8] [\_\_\_\_\_] inches at the point of maximum penetration. No grout hole will be drilled at an angle greater than [\_\_\_\_\_] degrees measured from the vertical nor to a depth greater than [\_\_\_\_\_] feet measured from the collar of the hole. If, as the work progresses, it is determined that holes to depths greater than indicated are necessary, drilling to such greater depth will be ordered in writing, and the drilling to depths in excess of [\_\_\_\_\_] feet will be paid for at a negotiated unit price.
- b. Perform drilling in accordance with the applicable grouting method hereinafter described. Whenever as much as [\_\_\_\_\_] percent of the drill water is lost or the cumulative total of successive water losses is estimated to amount to [\_\_\_\_\_] percent loss, or artesian flow is encountered, the drilling operations shall be stopped, the hole washed, pressure tested and grouted before drilling operations are resumed in such hole. The grout so injected remaining in a partially

completed hole shall be removed therefrom by washing or other methods before it has set sufficiently to require redrilling. Redrilling required because of the Contractor's failure to clean out a hole before the grout has set shall be performed at the Contractor's expense except that where the grout has been allowed to set by direction of the Contracting Officer, the redrilling will be paid for at the contract price for drilling the grout hole. Upon completion of drilling of any hole and prior to pressure testing, all drill cuttings and slurry shall be removed by applying water to the bottom of the hole [through open end rods] and returning the wash water through the hole to the surfaces until the return water is clear. No separate payment will be made for this washing.

### 3.2.3 Drain Hole Drilling

Drill drain holes with standard diamond drilling equipment, but no core recovery will be required and the Contractor may elect to use coring or noncoring bits. The minimum diameter of hole shall be [2 7/8] [\_\_\_\_\_] inches, measured at the point of maximum penetration. No drain hole will be drilled at an angle greater than [\_\_\_\_\_] degrees from the vertical nor to a depth greater than [\_\_\_\_\_] feet, measured from the collar of the hole. Drainage holes shall not be drilled in any location until all adjacent grout holes within a minimum distance of 150 feet have been drilled and grouted to full depth.

### 3.2.4 Completion of Grouting and Drain Hole Drilling

All grouting operations and all drain hole drilling shall be completed and in proper working condition prior to the time of impounding water. At that time all work in the [grouting and drainage galleries] [tunnels] shall be completed, all drain holes shall be uncovered and unobstructed, and the [galleries and their gutters] [tunnels] shall be free of all construction debris. Nipples for grout hole drilling will be removed from the [gallery] [cutoff trench] and disposed of and the finished grout holes will be patched.

### 3.2.5 Exploratory Hole Drilling

- a. Perform such exploratory drilling as may be required to determine the condition of the rock prior to grouting or the effectiveness of the grouting operations during or after grouting. All exploratory drilling shall be performed with rotary drilling equipment using coring type bits. Since the maximum recovery of unpredictable soft or friable materials is of prime importance, make every effort to recover 100 percent of the core by use of the appropriate equipment and drilling procedures.
- b. The holes may be required to be drilled to varying depths, with a maximum depth of [\_\_\_\_\_] feet. No exploratory hole will be drilled at an angle greater than [\_\_\_\_\_] degrees measured from the vertical.
- c. Special care should be exercised to obtain cores in as good condition as possible. Keep, in a manner satisfactory to the Contracting Officer, an accurate Driller's Log of all exploratory holes drilled. The log shall include a nontechnical description of all materials encountered in the drilling, their location in the holes and the location of special features such as seams, open cracks, soft or broken rock, points where abnormal loss or gain of drill water occurred, and any other items of interest in connection with the

purpose for which the exploratory drilling is required.

- d. Wooden or other approved core boxes will be furnished by [the Government] [the Contractor], and place the cores in the boxes in the correct sequence and separated accurately by wooden blocks, according to the measured distances in the hole. No box shall contain cores from more than one hole. The covers shall be fastened securely to the core boxes and delivered in the vicinity of the work as directed.
- e. Exploratory holes shall be grouted under pressure, if conditions so indicate, by [stop grouting] [grouting to full depth in one operation] and backfilled in accordance with paragraph BACKFILLING OF HOLES.

### 3.3 PROCEDURES FOR DRILLING AND GROUTING

#### 3.3.1 General

The drilling and grouting shall be accomplished in single or multiple lines as shown. The drilling and the grouting shall be done by [zones, using the split spacing, stage grouting method] [split spacing, stop grouting method] as described herein.

#### 3.3.2 Stage Grouting

Perform stage grouting of progressively deeper zones in stages with the placement of a grout curtain by drilling and grouting in successive operations in accordance with the following general procedure.

##### 3.3.2.1 Primary Holes

Primary holes for foundation grouting shall be drilled to their first stage of depth within the first zone. The depths will be governed by the foundation conditions.

- a. The holes thus drilled shall be washed and pressure tested, and then grouted, except that when pressure testing indicates a relatively tight hole, the Contracting Officer may direct that the grouting of that hole be omitted for that stage and the hole be left open for drilling and grouting of the next stage.
- b. After the grouting of any hole, the grout within the hole shall be [removed by washing or by other methods before it has set sufficiently to require redrilling][allowed to set and subsequently the holes shall be redrilled].
- c. After the interval of time as specified in paragraph SECOND STAGE, the primary holes not already drilled to the limit of the first zone shall be drilled as directed to additional depths not exceeding the zone limit.
- d. The primary holes thus deepened shall again be washed and pressure tested and then grouted at higher pressures as directed. Again, the grout within the hole shall be removed as described above.
- e. The process of successively drilling primary holes to additional depths and grouting at higher and higher pressures in stages, as directed, shall be repeated until all of the primary holes on the maximum spacing (see paragraph GROUT, DRAINAGE AND EXPLORATORY HOLES) have been completely drilled and grouted to the depth of the first

zone in that section of the grout curtain.

#### 3.3.2.2 Successive Holes

After the primary holes in the first zone have been completed in any section as specified above, the second and succeeding series of holes, as determined by the "split spacing method," shall be drilled and grouted to the depth of the first zone in like manner until the first zone of that section is completely grouted as directed.

#### 3.3.2.3 Completion of Section

The process of successively drilling to additional depths and grouting at higher and higher pressures in stages for the first series of holes and then for succeeding series of holes shall be repeated for the second and subsequent zones of that section. Other sections along the grout curtain shall be grouted in like manner until grouting of the foundation is completed to the satisfaction of the Contracting Officer. As the drilling and grouting work progresses, it may develop that conditions are such that all or parts of the foundation already grouted require additional grouting. In such event, the equipment shall be returned and additional holes shall be drilled and grouted as directed.

#### 3.3.3 Stop Grouting

Stop grouting is a method whereby each hole is drilled to a final depth and grouted by stops through an expansion plug or packer which is set at successively shallower depths. It involves the placement of a grout curtain by drilling and grouting in accordance with the following general procedure:

- a. Drill hole to the full depth and wash as specified in paragraph GROUT HOLE DRILLING.
- b. The holes thus drilled and washed shall be pressure tested, and pressure washed as specified in paragraph PRESSURE WASHING AND PRESSURE TESTING.
- c. The expansion plug, or packer, shall be placed in the hole at the top of the interval to be grouted blocking off the higher portion of the holes, and the interval is grouted. The lowest zone is grouted first. In no case will the Contractor be required to set the packer deeper than [\_\_\_\_\_] feet.
- d. After placing the grout at the pressure and mix directed by the Contracting Officer, the expansion plug, or packer, shall be left in place until the grout pressure drops to that pressure required for the next higher stop or as directed by the Contracting Officer.
- e. The expansion plug, or packer, shall then be moved to the next higher stop and grout placed at the lower pressure as directed by the Contracting Officer.
- f. The procedures described in subparagraphs "d" and "e" above shall be repeated until grouting of the hole is complete.
- g. After the primary holes in the first zone have been completed in any section as specified above, the second and succeeding series of holes, as determined by the "split spacing method" shall be grouted in like

manner until all zones of that section are completely grouted as directed.

- h. Other sections along the grout curtain shall be grouted in like manner until grouting of the foundation is completed to the satisfaction of the Contracting Officer.
- i. As the drilling and grouting work progresses, it may develop that conditions are such that all or parts of the foundation already grouted require additional grouting. In such event, the equipment shall be returned and additional holes for grouting shall be drilled and grouted as directed and no allowance above contract unit prices will be made for drilling and grouting such holes or for the expense of any movement of equipment necessary to the performance of such work.

#### 3.3.4 Pressure Washing and Pressure Testing

Immediately before the pressure grouting operation, the hole shall be thoroughly washed under pressure and pressure tested. All intersected rock seams and crevices containing clay or other washable materials shall be washed with water [and air] under pressure to remove as much of these materials as possible. If practicable, as determined by the Contracting Officer, such material shall be ejected from one or more holes by introducing water [and air] under pressure into an adjacent hole. In no case shall such pressure exceed the maximum grouting pressure as directed. All grout holes shall be tested with clean water under continuous pressure up to the maximum grouting pressure as directed. All holes sufficiently tight to build up the maximum required pressure shall be washed at such pressure and the washing shall continue as long as there is any increase in the rate at which water is taken, such increase indicating the fractures are being opened by the washing operation. Open holes in which no pressure can be built up shall be washed for a period of 5 minutes, with the pump operating at full capacity, or for such period of time as fracture-filling is being removed, as evidenced by the escape of muddy water through surface openings or other grout holes.

#### 3.3.5 Stage Grouting Procedures

##### 3.3.5.1 First Stage

Perform the first stage, or low-pressure, shallow-curtain grouting by washing and grouting holes at locations indicated or as directed, using the "split spacing" method described in paragraph SPLIT SPACING. Similar stages of drilling and grouting are repeated as necessary to reach the bottom of the first zone. Before grouting is begun in any hole of a given series in any section, at least the nearest two holes in advance of each such hole in that series shall be completely drilled for the same stage and the adjacent hole completely washed to facilitate washing and flushing out of any intervening clay-filled seams, fractures, or solution channels. No hole beneath any portion of the dam shall be grouted until all concrete within [100] [\_\_\_\_\_] feet has been placed to [full height] [\_\_\_\_\_] unless otherwise directed.

##### 3.3.5.2 Second Stage

After all first stage grouting in any section has been completed, as specified above, proceed, when so directed, with second stage drilling and grouting in accordance with the procedure outlined herein but in no case shall the deepening of any hole preparatory to grouting be commenced

before the previously placed grout has set: nor shall second stage grouting be conducted within a distance of approximately 100 feet of any hole in which a previous stage of grouting has been completed until the grout in such previous stage hole has [taken its set] [set for a period of 24-hours]. Grouting at subsequent stages shall conform to the same requirements as to minimum time and distance. Upon completion of all holes to the bottom of the first zone, and after the waiting period the primary holes are drilled to the next stage in the second zone and grouted at higher pressures. The process of drilling, washing, pressure testing, pressure washing, and grouting at progressively higher pressures are continued until the ground is satisfactorily tight to the required depth.

### 3.3.6 Stop Grouting Procedures

#### 3.3.6.1 Stop Grouting of Grout Holes

Perform the grouting by washing and grouting holes at locations indicated or as directed. Before grouting is begun in any hole of a given series in any section, at least the nearest two holes in the advance of each such hole in that series shall be completely drilled and the adjacent hole completely washed to facilitate washing and flushing out of any intervening clay-filled seams, fractures, or solution channels.

#### 3.3.6.2 Grouting of Existing Exploratory Holes

Existing exploratory holes or portions of holes more than five feet deep after excavation shall be cleaned [pressure-tested], and [pressure grouted] [gravity grouted] as specified for grout holes. Holes less than five feet deep shall be back-filled with grout mixed in proportions directed by the Contracting Officer. Gravity grouting or backfilling shall be done in accordance with paragraph BACKFILLING OF HOLES.

### 3.3.7 Grouting Pressures

Grouting pressures to be used in the work will vary with conditions encountered in the respective holes and pressures used shall be as directed. It is anticipated that pressures will range from [\_\_\_\_\_] psi to [\_\_\_\_\_] psi but in no event will pressures in excess of [\_\_\_\_\_] psi be required or allowed.

### 3.3.8 Grouting

All pressure grouting operations shall be performed in the presence of the [Contracting Officer][Government Inspector], and shall be in accordance with the following general procedures.

#### 3.3.8.1 Grout Mixes

Mixes shall be in the proportions directed by the Contracting Officer who will, from time to time, direct changes to suit the conditions found to exist in the particular grout hole. [The cement grout will include 2 percent to 5 percent (by weight of cement) of sodium bentonite]. The water/cement ratio by volume will be varied to meet the characteristics of each hole as revealed by the grouting operation and will range between [\_\_\_\_\_] and [\_\_\_\_\_]. The types of grout shall be as follows:

- [a. Cement Grout shall consist of cement, (bentonite) and water.]
- [b. Mortar Grout shall consist of cement, (bentonite), sand, and

water.]

### 3.3.8.2 Grout Injection

- a. In general, if pressure tests indicate a tight hole, grouting shall be started with a thin mix. If an open hole condition exists, as determined by loss of drill water or inability to build up pressure during washing operations, then grouting shall be started with a thicker mix and with a grout pump operating as nearly as practicable at constant speed at all times; the ratio will be decreased, if necessary, until the required pressure has been reached. [If this procedure does not produce the desired pressure, mortar grout shall be used and the mix varied as necessary to produce the desired results.]
- b. When the pressure tends to rise too high, the water/cement ratio shall be increased [and/or the mix of mortar grout changed or discontinued] as may be required to produce the desired results. If necessary to relieve premature stoppage, periodic applications of water under pressure shall be made. Under no conditions shall the pressure or rate of pumping be increased suddenly as either may produce a water-hammer effect which may promote stoppage.
- c. The grouting of any hole shall not be considered complete until [that hole refuses to take any grout whatever at three-fourths of the maximum pressures required for that stage] [that hole takes grout at the rate of one cubic foot of grout or less in ten minutes measured over at least a five minute period at the pressure required for that portion of the hole being grouted.]
- d. Should grout leaks develop, caulk such leaks when and as directed, the cost thereof being included in the contract price for unit price pay item "Placing Grout", in accordance with Section 01 22 00.00 10 PRICE AND PAYMENT PROCEDURES.
- e. If, due to size and continuity of fracture, it is found impossible to reach the required pressure after pumping a reasonable volume of grout at the minimum workable water/cement ratio [or mortar grout with the maximum volume of sand at the minimum water/cementing materials ratio] the speed of the pumping shall be reduced or pumping shall be stopped temporarily and intermittent grouting shall be performed, allowing sufficient time between grout injections for the grout to stiffen. Following such reduction in pumping speed, if the desired result is not obtained, grouting in the hole shall be discontinued when directed. In such event, the hole shall be cleaned, the grout allowed to set, and additional drilling and grouting shall then be done in this hole or in the adjacent areas as directed, until the desired resistance is built up.
- f. After the grouting of any [stage] [stop] of a hole is finished, the pressure shall be maintained by means of a stop-cock or other suitable device until the grout has set to the extent that it will be retained in the hole.
- g. Grout that cannot be placed, for any reason, within two hours after mixing shall be wasted. If such grout is mixed at the direction of the Contracting Officer or with his knowledge and consent, such wasted grout, except as specified in Section 01 22 00.00 10 PRICE AND PAYMENT PROCEDURES, shall be paid for at the contract unit prices for the materials contained therein.

### 3.3.8.3 Backfilling of Holes

Holes shall be backfilled with grout proportioned as directed by the Contracting Officer and generally having a water/cement ratio less than 1.0. The backfilling shall be accomplished by injection of grout through a tremie pipe or hose inserted to full depth of hole. When grout vents at the surface, the tremie shall be gradually withdrawn, maintaining grout in pipe or hose until completely removed. Holes containing freshly injected grout shall not be backfilled until the injected grout has set. No separate payment will be made for backfilling holes; however, grout will be paid for at the contract unit price for the Portland cement therein.

### 3.3.8.4 Equipment Arrangement and Operation

The arrangement of the grouting equipment shall be such as to provide a continuous circulation of grout throughout the system and to permit accurate pressure control by operation of a valve on the grout return line, regardless of how small the grout take may be. The equipment and lines shall be prevented from becoming fouled by the constant circulation of grout and by the periodic flushing out of the system with water. Flushing shall be done with the grout intake valve closed, the water supply valve open, and the pump running at full speed.

### 3.3.8.5 Protection to Work and Cleanup

[Except as otherwise specified, no grouting will be permitted within [\_\_\_\_\_] feet of installed perforated pipe or gravel filters for foundation drains. Where permitted in such locations, maintain a flow of water through the drains likely to be affected, to serve as tell-tales. In case leakage of grout into drains does occur immediately stop the grouting operations and remove all grout from the drains affected by washing to the satisfaction of the Contracting Officer. Payment for washing will be in accordance with unit price pay item "Pressure Washing and Pressure Testing" in [this Section][Section 01 22 00.00 10 PRICE AND PAYMENT PROCEDURES]. Such stopping of grouting operations and washing of drains shall be repeated as often as required to complete the curtain grouting.] During grouting operations take such precautions as may be necessary to prevent drill cuttings, equipment exhaust oil, wash water, and grout, from defacing or damaging the permanent structure. Daily maintenance may be required along grout lines, in order to offer better inspection of interconnected holes and breakouts. The Contractor will be required to furnish such pumps as may be necessary to care for waste water and grout from his operations. Upon completion of these operations, clean up all waste resulting from his operations that is unsightly or would interfere with the efficient operation of the project as anticipated by the original design.

### 3.3.9 Records

The Contracting Officer will keep records of all grouting operations, such as a log of the grout holes, results of washing and pressure testing operations, time of each change of grouting operation, pressure, rate of pumping, amount of cement for each change in water/cement ratio, and other data as deemed by him to be necessary. Furnish all necessary assistance and cooperation to this end.

3.3.10 Communications

When, for its own convenience, the Contractor has the individual elements of the plant so located that communication by normal voice between these elements is not satisfactory, the Contracting Officer may require him to install a satisfactory mechanical means of communications, such as a telephone or other suitable device.

-- End of Section --

SECTION 31 60 00

FOUNDATION PREPARATION

11/08

PART 1 GENERAL

1.1 UNIT PRICES

1.1.1 Preliminary Cleanup

1.1.1.1 Payment

Payment will be made for costs for each preliminary cleanup satisfactorily performed at the direction of the Contracting Officer. Payment will be made for each cleanup of the same area if more than one cleanup has been directed and satisfactorily performed.

1.1.1.2 Measurement

Preliminary cleanup will be measured for payment by determining the area cleaned to the nearest square yard.

1.1.1.3 Unit of Measure

Unit of measure: square yard.

1.1.2 Final Cleanup

1.1.2.1 Payment

Payment will be made for costs associated with final cleanup of the area [for each type of foundation preparation] that has been satisfactorily prepared. Where preliminary cleanup has been directed and performed and the Contractor subsequently performs final cleanup, payment will be made for preliminary cleanup. Payment will not be made for any cleanup subsequent to final cleanup.

1.1.2.2 Measurement

Final cleanup will be measured for payment by determining the area cleaned to the nearest square yard.

1.1.2.3 Unit of measure

Square yard.

1.1.3 Foundation Preparation

1.1.3.1 Payment

Payment will be made for costs associated with foundation preparation of the area that has been satisfactorily prepared. Where preliminary cleanup has been directed and performed and the Contractor subsequently performs foundation preparation, payment will be made for foundation preparation. Payment will not be made for more than one foundation preparation of the same area.

1.1.3.2 Measurement

Foundation preparation will be measured for payment by determining the area prepared to the nearest square yard.

1.1.3.3 Unit of measure

Square yard.

1.1.4 Dental Concrete

1.1.4.1 Payment

Not Applicable.

1.1.4.2 Measurement

Not Applicable.

1.1.4.3 Unit of measure

Not Applicable.

1.1.5 Dental Mortar

1.1.5.1 Payment

Not Applicable.

1.1.5.2 Measurement

Not Applicable.

1.1.5.3 Unit of measure

Not Applicable.

1.2 DEFINITIONS

1.2.1 Foundations

Not Applicable.

1.2.2 Rock Joints

Not Applicable.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Tools; G[, [\_\_\_\_]]

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Dental Concrete

Not Applicable.

2.1.2 Dental Mortar

Not Applicable.

2.1.3 Shotcrete

Not Applicable.

2.1.4 Welded Wire Fabric

Not Applicable.

2.1.5 Filter Material

Not Applicable.

PART 3 EXECUTION

3.1 EXAMINATION

The limits of the proposed foundations for the various parts of the work are approximately as indicated. The Contracting Officer reserves the right to change the depth to, or the width of, the foundations if, conditions exposed in the foundation excavations, or as determined by exploratory drilling, warrant such modifications. In such a case, contractor shall coordinate with EOR.

3.2 PREPARATION

3.2.1 Equipment

3.2.1.1 Tools

Submit for approval tabular list of light power tools, to be used in lieu of hand tools, prior to their use on the job site. Hand tools, where required or permitted by these specifications include, but are not limited to [shovels,] [bars,] [picks,] [wedges,] [and] [brooms]. Light power tools may be used in lieu of hand tools only when such use is approved.

3.2.1.2 Air Jet

Not Applicable.

3.2.1.3 Air/Water Jet

Not Applicable.

## 3.2.1.4 Water Jet

Not Applicable.

## 3.3 PRELIMINARY CLEANUP

When the excavation has reached the approximate limits shown or when the Contracting Officer determines that a satisfactory foundation may have been reached, the Contracting Officer may direct that a preliminary cleanup be performed on all or any part of the rock foundation surface. This cleanup shall consist of removing all debris, loose rock, sand, silt, and other objectionable material by hand tools or any combination of additional methods approved or directed. The Contracting Officer may require that the excavation be continued and the preliminary cleanup procedure repeated until a satisfactory foundation surface is reached.

## 3.4 FINAL CLEANUP AND FOUNDATION PREPARATION

Unless otherwise directed, Final Cleanup and Foundation Preparation , Structural shall be performed. This work shall consist of removing loose and/or weather rock and pockets of fines, sand, rock rubble or gravel and other objectionable material from the in place rock surface including areas of depression, large crevices, and open rock joints. Mechanical equipment may be used but such equipment will be rubber tired only. Picking, barring, and hand excavation may be necessary to obtain a foundation surface free from loose, drummy, or shattered materials. Slopes shall not be steeper than 1 vertical on 1.5 horizontal UNO. Vertical surfaces shall not be higher than 2 feet and benches between vertical surfaces shall be of such width so as to provide a stepped slope comparable to the adjacent uniform slope.

## 3.5 DENTAL TREATMENT

Not Applicable.

## 3.5.1 Dental Concrete

Not Applicable.

## 3.5.2 Dental Mortar

Not Applicable.

## 3.6 PROTECTIVE TREATMENT

Not Applicable.

## 3.6.1 Wetting

Not Applicable.

## 3.6.2 Shotcrete

Not Applicable.

## 3.6.3 Protective Coating

Not Applicable.

3.6.4 Protective Backfill

Not Applicable.

3.6.5 Protective Concrete

Not Applicable.

3.6.6 Temporary Earth Cover

Not Applicable.

3.7 TESTS

3.7.1 General

Establish and maintain quality control for foundation preparation operations to assure compliance with contract specifications and maintain records of the quality control for all operations including but not limited to the following:

3.7.1.1 Equipment

Quantity and type.

3.7.1.2 Foundation Excavation

Strict adherence to foundation excavation limits and depths.

3.7.1.3 Inspection, Mapping, and Cleanup

Orderly prosecution of inspections, mapping, and cleanup of foundation excavation areas.

3.7.1.4 Specialized operations

Not Applicable.

3.7.2 Reports

Submit three copies of these records of inspection as well as corrective action taken daily.

3.8 FOUNDATION INSPECTION

Inspections to determine adequacy of the foundations will be performed by the Contracting Officer in all foundation areas between completion of excavation and placement of concrete. The Contractor will cooperate to the extent necessary to assist in inspection. Coordinate the schedule for foundation excavation and preliminary cleanup with the Contracting Officer to ensure that the cleanup, inspection, and mapping proceed in an orderly manner.

-- End of Section --